Appendix F

Harris Environmental Group, Inc.
Final Biological Assessment
TEP Proposed Sahuarita-Nogales
Transmission Line Project
Crossover Corridor (HEG 2004c)

FINAL BIOLOGICAL ASSESSMENT

OF THE

TUCSON ELECTRIC POWER

SAHUARITA – NOGALES TRANSMISSION LINE

CROSSOVER CORRIDOR

12 APRIL 2004

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EXECUTIVE SUMMARY

Tucson Electric Power (TEP) and Citizens Communications (Citizens) are proposing to build a new, dual-circuit, 345,000-volt (345-kV) transmission line from the TEP South Substation in the vicinity of Sahuarita, Arizona to interconnect with Citizens system at a Gateway Substation that TEP will construct west of Nogales, Arizona. From the Gateway Substation, the proposed transmission line will continue south across the United States-Mexico border for approximately 60 miles (mi) (98 kilometers [km]) into the Sonoran region of Mexico, connecting with the Comisión Federal de Electricidad (CFE, the national electric utility of Mexico) at the Santa Ana Substation. The proposed transmission line will improve Citizens' service in Nogales and allow for the transfer of blocks of electrical energy between the United States and Mexico. Southern Arizona and Sonora, Mexico have experienced rapid growth, and forecasts predict this growth will continue. Citizens' customers have already experienced outages due to limited transmission facilities into the region. TEP recognizes the need to improve transmission into the southern Arizona region and proposes to assist Citizens in meeting an Arizona Corporation Commission (ACC) mandate to improve the reliability and service of its Nogales electrical system. The ACC has ordered Citizens to improve its system by the end of 2003. The TEP Sahuarita – Nogales Transmission Line, a double-circuit 345-kV transmission line will provide the additional reliability that Citizens requires while providing additional capacity into the southern Arizona region for future needs.

This Biological Assessment (BA) was prepared to meet the requirements of Section 7 of the Endangered Species Act (ESA) of 1973, 16 U.S.C. Section 1536(a)(2). Section 7 requires all federal agencies to consult with the United States Fish and Wildlife Service (USFWS) if an action may affect listed species or their designated critical habitat. Section 7 consultation is required for any project that requires a federal permit or receives federal funding. Action is defined broadly to include funding, permitting, and other regulatory actions. All activities associated with construction of the TEP Sahuarita – Nogales Transmission Line are included in the proposed action being evaluated for this BA. Because TEP has applied for a Presidential Permit to construct the transmission line across the international border, the Department of Energy (DOE) is preparing a Draft Environmental Impact Statement (DEIS) (Tetra Tech 2003) concurrently with this document.

Federal agencies must ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species, or result in the destruction or adverse modification of designated critical habitat. This is accomplished through consultation with the USFWS. If such species may be present, the applicant must conduct a BA to determine if a proposed action is likely to adversely affect listed species or designated critical habitat. The USFWS will review this BA and issue a biological opinion (BO). DOE is the permitting agency for this proposed action, and therefore the lead federal agency in Section 7 consultation with the USFWS.

The proposed action crosses a variety of land jurisdictions: including private, Arizona State Land Department (ASLD), Bureau of Land Management (BLM), and United States Department of Agriculture Forest Service (USFS). Because each jurisdiction has different requirements for environmental review of the proposed action, this document is subdivided by agency. SECTION 2 addresses species that receive protection under the ESA of 1973. SECTION 3 reviews the potential effects of the proposed action on those species classified as “Sensitive” by the USFS. SECTION 4 reviews the potential effects of the proposed action on those species classified as “Sensitive” by the BLM. SECTION 5 addresses those species that are considered “Wildlife of Special Concern” by the Arizona Game and Fish Department (AGFD). Because habitats often overlap different jurisdictions, many species have classifications within each agency. In these instances, the species is evaluated under the jurisdiction which affords the highest level of protection.

We contacted federal (USFWS) and state (AGFD) natural resource agencies to request information on possible special status species (sensitive, threatened, and endangered) that may exist on or near the proposed Crossover Corridor of the TEP Sahuarita – Nogales Transmission Line from Sahuarita to Nogales, Arizona. Agency correspondence is presented in Appendix A.

SUMMARY OF DETERMINATIONS FOR FEDERALLY LISTED SPECIES

Based on contact with the USFWS, USFS, BLM, and AGFD, 9 federally listed species may be affected by the proposed action. After reviewing the current status of these species, the environmental baseline of the project area, the effects of the proposed actions on the species as well as cumulative effects, the following determinations are made for the 9 affected species:
(Table 1).

Table 1. Effects of the proposed action on federally listed species.

SPECIES	**POTENTIAL EFFECT**
Mexican spotted owl	The proposed action may affect, but is not likely to adversely affect this species. The proposed action may affect, but is not likely to adversely affect proposed critical habitat for this species.
Cactus ferruginous pygmy-owl	The proposed action may affect and is likely to adversely affect this species.
Southwestern willow flycatcher	The proposed action may affect but is not likely to adversely affect this species.
Lesser long-nosed bat	The proposed action may affect and is likely to adversely affect this species
Chiricahua leopard frog	The proposed action may affect but is not likely to adversely affect this species
Pima pineapple cactus	The proposed action may affect and is likely to adversely affect this species.
Jaguar	The proposed action may affect but is not likely to adversely affect this species.

Table 1 continued. Effects of the proposed action on federally listed species.

SPECIES	POTENTIAL EFFECT
Gila topminnow	The proposed action may affect but is not likely to adversely affect this species.
Mexican gray wolf	The proposed action may affect but is not likely to adversely affect this species.

1.0 PROJECT DESCRIPTION

1.1 PROPOSED ACTION

The proposed TEP Crossover Corridor Sahuarita – Nogales Transmission Line will consist of twelve transmission line wires, or conductors, and two neutral ground wires that will provide lightning protection and fiber optic communication, on a single set of support structures. The transmission line will originate at TEP's existing South Substation, in the vicinity of Sahuarita, Arizona, and interconnect with Citizens system at a Gateway Substation that TEP will construct west of Nogales, Arizona. The double-circuit transmission line will continue from the Gateway Substation south to cross the United States-Mexico border and extend approximately 60 mi (98 km) into the Sonoran region of Mexico, connecting with the Comisión Federal de Electricidad (CFE, the national electric utility of Mexico) at the Santa Ana Substation. Figure 1 shows the overall proposed project location.

The South Substation in Sahuarita will be upgraded and expanded to provide interconnection between a new TEP 345-kV transmission line and the new Gateway Substation west of Nogales. The South Substation will be expanded by approximately 1.3 acres (0.53 ha) to add a switching device that will connect to the proposed transmission line, with a 100 ft (30 m) expansion of the existing fence line for the addition of the second 345-kV circuit. The new Gateway Substation will include a 345-kV to 115-kV power transformer to provide power to the local area. The new Gateway Substation will be constructed within a developed industrial park north of Mariposa Road (State Route 189), approximately 0.5 mi (0.8 km) east of the Coronado National Forest (CNF) boundary (Northeast ¼ of Section 12, Township 24 South, Range 13 East). The TEP portion of the site (the area that will be graded) is approximately 18 acres (7.3 ha) and is within the City of Nogales, Arizona. TEP has purchased the substation site and preliminary construction activities have been completed. TEP is flexible in the placement of a fiber-optic regeneration site, but it will likely be located in the area of Township 18 South, Range 12 East, approximately 10 mi (16 km) southwest of Sahuarita on private land. The fiber optic regeneration site will consist of an approximate 0.5-acre (0.2-ha) fenced yard, containing a 10 ft (3 m) by 20 ft (6 m) concrete pad with an equipment house. The cleared area for the equipment house will be approximately 20 ft (6 m) by 30 ft (9 m). There will be three 3-acre (1.2-ha) construction staging areas (located near the South and Gateway Substations and the Interstate 19 [I-19]/Arivaca Road interchange) and an 80 acre (32 ha) temporary laydown yard (also near the I-19/Arivaca Road interchange) used during construction of the proposed line.

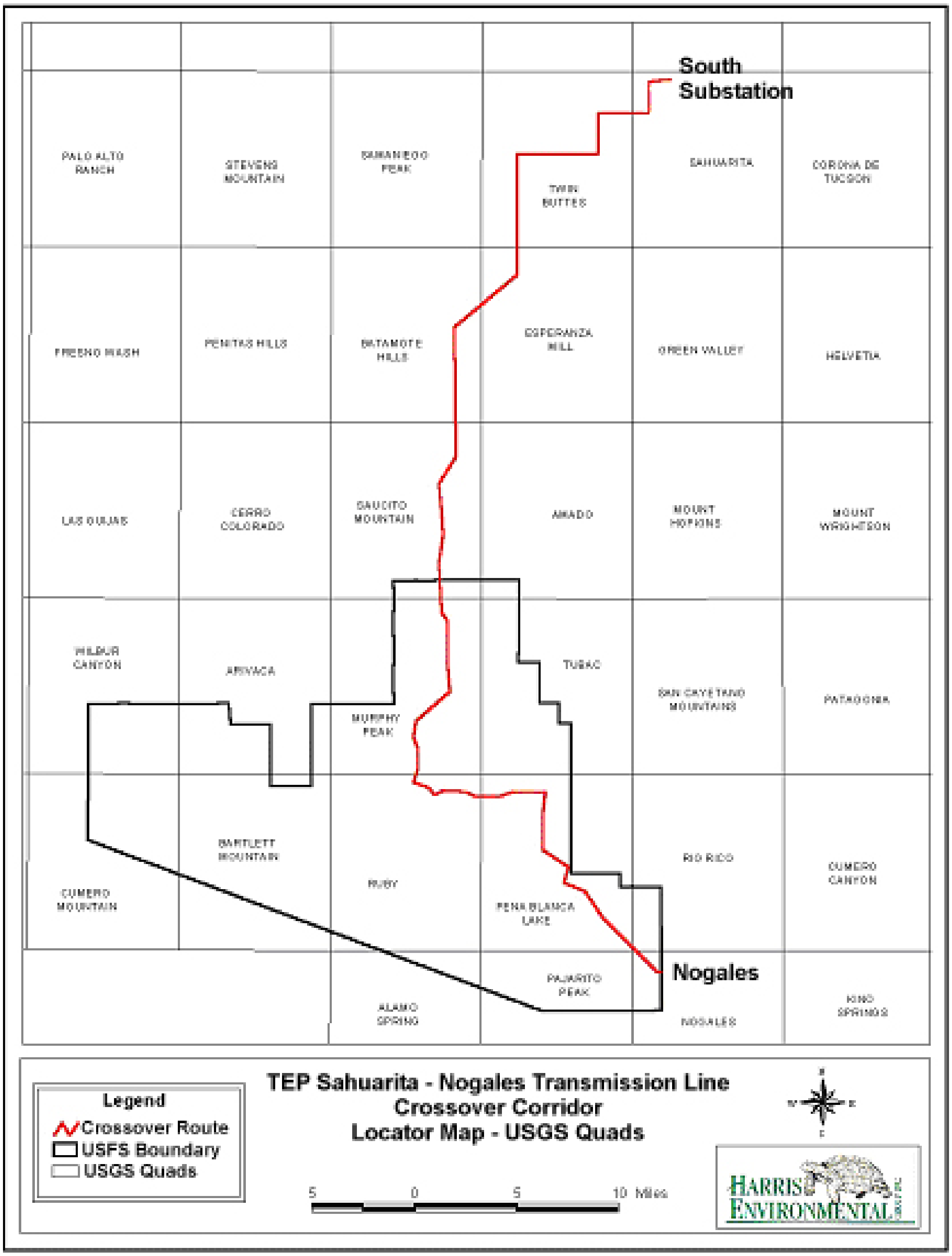
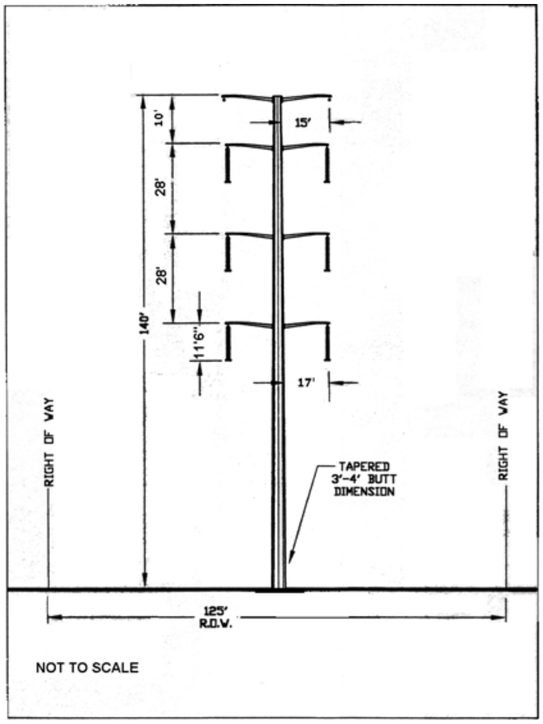


Figure 1. Map of the TEP Sahuarita – Nogales Transmission Line Crossover Corridor.

The primary support structures to be used for the transmission line are self-weathering steel single structures, or monostructures (Figure 2). Dulled, galvanized steel lattice towers (Figure 3) will be used in locations where their use will minimize overall environmental impacts, in accordance with Arizona Corporation Commission (ACC) Decision No. 64356 (ACC 2001).



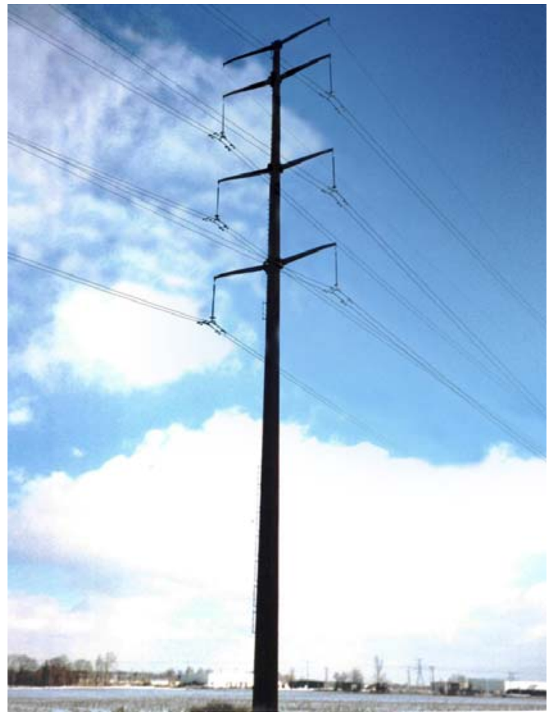


Figure 2. Monopole Transmission Line Structure Drawing and Photo.

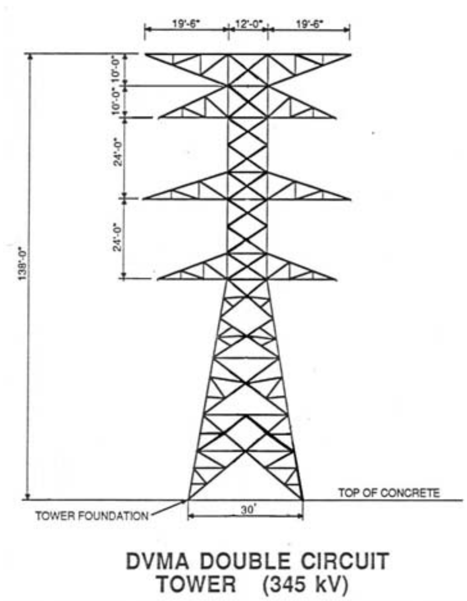


Figure 3. Lattice Tower Transmission Line Structure Drawing and Photo.

1.2 PROJECT LOCATION

The Crossover Corridor extends for approximately 65.2 mi (105 km), from the South Substation to the United States-Mexico border including 17 mi (27 km) along the EPNG gas line right-of-way (ROW). The length of the Crossover Corridor is 29.3 mi (47.2 km) within the CNF and 1.25 mi (2.01 km) on BLM land. The Crossover Corridor would require approximately 448 support structures, including approximately 196 within the CNF and 9 on BLM land.

The Crossover Corridor exits the TEP South Substation located within the incorporated area of the Town of Sahuarita and proceeds westerly for approximately 1.0 mi (1.6 km) before turning south for 1.5 mi (2.4 km). The corridor turns west across I-19 and continues through Pima County to the southwest, crossing approximately 1.25 mi (2.01 km) of federal land managed by BLM parallel to two existing TEP transmission lines (138-kV and 345-kV). The corridor turns south to parallel the EPNG gas line ROW for approximately 5.8 mi (9.3 km) and passes just east of the existing TEP Cyprus Sierrita Substation.

The Crossover Corridor continues past the Cyprus Sierrita Substation to the southwest, then turns south and enters Santa Cruz County after 6.3 mi (10 km). The corridor enters the CNF 6.0 mi (9.7 km) south of the Santa Cruz County line. The corridor passes south along the west side of the Tumacacori and Atascosa mountains. The corridor turns east through Peck Canyon for approximately 7 mi (11.3 km). At the point where Peck Canyon meets the EPNG gas line ROW, the corridor turns south parralleling the gas line. The Central Corridor continues through the CNF, paralleling the EPNG pipeline ROW to the southeast for several miles to the forest boundary. The proposed corridor exits CNF onto private land and proceeds 0.5 mi (0.8 km) east to the Gateway Substation. From the Gateway Substation, the proposed corridor returns to the west through private land and then turns south to parallel the CNF boundary. The proposed corridor meets the United States-Mexico border approximately 3,300 ft (1,006 m) west of Arizona State Highway 189 in Nogales, Arizona.

TEP will use existing access roads where feasible. Approximately 20.7 mi (33.3 km) of temporary new roads will be built for construction of the corridor on CNF (URS 2003a); spur roads off existing access roads adjacent to TEP transmission lines will provide project access on BLM land. Transmission line tensioning, pulling, and fiber-optic splicing sites will also disturb land. The total new temporary area of disturbance on CNF during construction of the corridor will be approximately 238 acres (96.3 ha) (URS 2003a). Following construction, TEP will close new roads, construction areas, and existing roads not required for project maintenance in accordance with agreements with land owners or managers (e.g., BLM or USFS). On USFS land, TEP will close existing road mileage equal to that required for project maintenance, to avoid impacting the current road density. The maintenance access required by TEP will be limited to roads to selected structures, rather than a single cleared ROW leading to the United States-Mexico border. On the CNF transmission line tensioning and pulling sites, fiber-optic splicing sites, and construction yard areas will be obliterated within six months of the project becoming fully operational (URS 2003a).

1.3 PROJECT AREA

The project area includes the location where all construction and associated activities will occur along the ROW. Action areas are locations affected directly or indirectly by these activities and often include sites outside the immediate area of construction. Action areas are unique for each listed species and are outlined in SECTION 2.0 of this document.

Between Sahuarita and Nogales, the proposed action crosses four distinct biotic communities, or biomes (Brown 1994). A complete list of plant species documented during field surveys in 2002 is presented in Appendix B.

Figure 4. Sonoran desertscrub.

The northern end of the corridor contains vegetation characteristic of the Sonoran desertscrub biome (Figure 4). This biome is typically represented by saguaro (*Carnegiea gigantea*), cholla and prickly pear (*Opuntia* spp.) cacti, ocotillo (*Fouquieria splendens*), mesquite, (*Prosopis velutina*), acacia (*Acacia* spp.) paloverde (*Parkinsonia* spp.), creosote (*Larrea tridentata*), triangle-leaf bursage (*Ambrosia deltoidea*), and brittlebush (*Encelia farinosa*).

Vegetation south of the ASARCO mine transitions into the semidesert grassland biome (Figure 5). This area is dominated by grama (*Bouteloua* spp.), lovegrass (*Eragrostis* spp.), and three-awn (*Aristida* spp.) grasses, with low shrubs such as mesquite and acacia locally co-dominant. Agave (*Agave* spp.) and yucca (*Yucca* spp.) are also common in this biome. These grasslands are transected by desert riparian scrub dominated by mesquite and netleaf hackberry (*Celtis reticulata*).

Figure 5. Semidesert grassland.

Figure 6. Madrean oak woodland.

The higher elevations (above 3,500 ft [1,067 m]) of the project area are within the madrean oak woodland biome (Figure 6). Representative plants of this biome within the project area include Mexican blue oak (*Quercus oblongifolia*) and emory oak (*Q. emoryi*) trees, side-oats grama (*B. curtipendula*), hairy grama (*B. hirsuta*), and fluffgrass (*Erioneuron pulchellum*).

The 4th biome represented within the project area is the Sonoran deciduous riparian forest (Figure 7), which is located south of Arivaca Road in Sopori Wash and Peck Canyon. The high water table in these areas supports stands of cottonwood (*Populus fremontii*), ash (*Fraxinus pennsylvanica* ssp. *velutina*), sycamore (*Platanus wrightii*), walnut (*Juglans major*), netleaf hackberry, and willow (*Salix* spp.) trees.

Figure 7. Sonoran deciduous riparian forest.

The IRA within Peck Canyon encompasses 21,363 ha (52,788 ac) and was established by a Record of Decision on January 12, 2001 on the Roadless Area Conservation Final EIS.

Figure 8. Area burned in Walker fire.

Between 12 June and 22 June 2002, the Walker Fire, a human-caused fire, burned 16,369 ac (6,624 ha) of land along the United States-Mexico border approximately 1mi (1.6 km) west of the southern end of the Crossover Corridor. Portions of the Walker fire were very hot, especially near the international border and the upper slopes of ridges, while other areas, like Walker Canyon, burned relatively cool (T. Newman, CNF, pers. comm., 26 November 2002). While vegetation has begun to recover in some areas, other areas are highly susceptible to erosion due to reduced groundcover (Figure 8).

1.4 CONSERVATION MEASURES

PROJECT-WIDE CONSERVATION MEASURES

1. Environmental Training - All construction supervisors will be required to attend environmental training, which will outline their obligation to obey applicable laws and regulations regarding wildlife and habitats (Appendix C).

2. Erosion Control Measures - TEP is in consultation with CNF regarding development of Best Management Practices (BMPs) for minimizing proposed project impacts on geologic, soil, and water resources on national forest land, in accordance with the USFS "Soil and Water Conservation Practices Handbook" (USFS 1990). Specific BMPs will be identified after coordination with Arizona Department of Environmental Quality (ADEQ) and before implementation of the project, for the entire length of the selected corridor.

3. Fire Prevention Plan - A Fire Prevention Plan is under development to minimize the risk of accidental wildfire. All construction activities will adhere to this plan and fire suppression equipment will be available to all work crews. On CNF lands, the Fire Prevention Plan will comply with Forest Service Manual 5100.

4. Hazardous Material Spill Response Plan - A Hazardous Material Spill Response Plan is under development which will describe the measures and practices to prevent, control, cleanup, and report spills of fuels, lubricants, and other hazardous substances during construction operations. This plan will ensure that no hazardous materials are stored, dispensed, or transferred in streams, watercourses, or dry washes, and vehicles are regularly inspected and maintained to prevent leaks.

5. Invasive Species Control - An Invasive Species Management Plan in accordance with Executive Order 13112 is under development in coordination with CNF, ASLD, and BLM to identify problem areas and mitigation measures.

6. Road Closure/Obliteration - TEP has committed to obliterate and permanently close 1 mi (1.6 km) of existing road on CNF (to be identified by CNF) for every 1 mi (1.6 km) of proposed road used in the construction, operation, or long-term maintenance of the proposed action. TEP will monitor road closures during regularly scheduled inspection flights and/or ground inspections, and repair or replace road-closure structures as necessary following construction. Furthermore, TEP will cooperate with landowners on all ongoing road closure maintenance.

   The following selective criteria and techniques for closing roads are taken from Section 1.3.2 of the Roads Analysis (URS 2003) and applies to access roads on CNF. Administrative roads will be closed to the general public but made available to TEP and its assigned contractors for the evaluation, maintenance, or upgrading of existing facilities.

Closure methods for administrative roads will include the following:

a. Placement of heavy pipe posts with an attached, locked chain entrance on the road.

b. Placement of heavy pipe posts with an attached, locked gate in a manner that blocks entrance on the road.

c. Placement of a pipe barricade across the roadbed, locked in place in multiple locations in concrete sleeves.

The following methods may be used for the long-term closure of transmission line access roads used during construction and those roads required to be closed by the CNF. These roads may be reopened for emergency repair of transmission facilities, but will not be used intermittently as with administrative roads. Techniques include:

a. Placement of boulders or other natural impediments across the road.

b. Placement of a berm or trench across the the road.

c. Rip, obliterate, and reseed/revegetate portions of roadbed as needed. This effort could be applied to the initial visual portion of roadway (e.g., first 100 ft [30 m]) to effectively obscure the roadway. This could be accomplished by transplanting native species of medium and large vegetation from the general area and reseeding with native grasses. By obscuring visible portions of roadway, future vehicular travel could be more effectively discouraged than by placing berms or other unnatural impediments to an otherwise visually inviting roadway.

7. Additional mitigation measures are outlined in Table 2.2-2 of the DEIS (Tetra Tech 2003).

SPECIES-SPECIFIC CONSERVATION MEASURES

Mexican spotted owl (MSO)

1. Breeding season restriction – no construction activity will occur between Structures #297 and #312 of Segment 8 from 1 March to 31 August.

2. No trees over 9 in diameter breast height (DBH) in MSO habitat will be removed.

Cactus ferruginous pygmy-owl (CFPO)

1. Protocol surveys – 2 consecutive years of protocol surveys must be conducted before construction activities can begin within 1,969 ft (600 m) of designated habitat. If a CFPO is detected, USFWS has determined that certain continued construction activities will not harm or harass a CFPO as defined by ESA regulations. In areas where two consecutive years of protocol surveys cannot be completed, construction will occur outside of the breeding season.

Four zones are described (Zone I through Zone IV) that are based upon the distance of construction activity from a known nest or activity center. Certain levels of construction can occur within each zone without resulting in harm or harassment of the species. Situations that do not comply with the restrictions provided for each zone will require USFWS authorization before construction continues. Specific development restrictions that apply to each of the four zones are described in the sections below:

<u>Zone I: 0 to 328 ft (100 m) from the CFPO Activity Center</u>

1. No additional clearing of vegetation will be permitted without authorization from USFWS and relevant land management agencies.

2. Construction-related activities may continue on land that has been cleared of vegetation provided that they do not exceed the level and/or intensity of activity that was occurring during the period of time that the territory was established.

3. Activities that will be more intense or cause more noise disturbance than was occurring during the period of time that the territory was established cannot proceed without authorization from USFWS and relevant land management agencies.

<u>Zone II: 328 ft (100 m) to 1,312 ft(400 m) from the CFPO Activity Center</u>

1. No additional clearing of vegetation will be permitted without authorization from USFWS and relevant land management agencies.

2. No restrictions on the nature or type of construction activity (excluding the clearing of vegetation) from 1 August through 31 January of the following calendar year.

3. Construction activities during the breeding season (1 February to 31 July) cannot exceed the levels or intensity of activities that occurred at the time the territory was established.

<u>Zone III: 1,312 ft (400 m) to 1,969 ft (600 m) from the CFPO Activity Center</u>

1. No additional clearing of vegetation will be permitted without authorization from USFWS and relevant land management agencies.

2. No restrictions on the levels or intensity of construction activity (excluding the clearing of vegetation) at any time of the year.

<u>Zone IV: Greater than 1,969 ft (600 m) from the CFPO Activity Center</u>

1. No restrictions – any activity consistent with the project description provided to USFWS (as amended by supplemental reports) is allowed. For the purposes of this consultation, USFWS assumes that all construction or

construction-related activities referred to under each zone description will be limited to those described in the project description in this BA.

2. All saguaros within construction areas will be transplanted or mitigated with minimum 6.5 ft (2 m) specimens. Within riparian desertscrub and deciduous riparian areas, tree and shrub removal will be minimized to the greatest extent possible.

Southwestern willow flycatcher (SWFL)

1. All damaged deciduous riparian vegetation will be mitigated with pole plantings of willow or cottonwood at a 2:1 ratio by species.

Lesser long-nosed bat (LLNB)

1. Agave within construction areas will be transplanted or replaced with similar age and size class individuals.

Chiricahua leopard frog (CLF)

1. Surveys for CLF will be conducted within Peck Canyon in the year immediately prior to construction for this species. If CLF are detected, consultation with USFWS will be reinitiated.

Pima pineapple cactus (PPC)

1. Purchase of credits in a USFWS-approved conservation bank for PPC.

Jaguar

1. Five remote cameras will be donated to the Jaguar Conservation Team to assist with monitoring of jaguar movements across the Arizona-Mexico border. These 5 cameras will all be placed within the Tumacacori EMA under permit from the CNF. If a female jaguar or cubs are documented by the Jaguar Management Team within the Tumacacori EMA, consultation with USFWS will be reinitiated.

2.0 FEDERALLY LISTED SPECIES

Special status species are plant and wildlife species that are of concern because their populations are either in jeopardy of extinction or are declining in number. The AGFD and USFWS were contacted concerning information on possible threatened and endangered species that may exist on or near the proposed action.

In a letter dated 14 May 2002, the USFWS listed 18 Endangered species, 7 Threatened species, and 2 Proposed species that occur in Pima and Santa Cruz Counties, Arizona (Table 2). Agency correspondence is presented in Appendix C. Species included in the USFWS correspondence, but excluded from evaluation are addressed in Appendix D.

Meetings with USFWS and USFS personnel were held on 9 April, 13 May, 3 December 2002, and 28 March 2003 to discuss the potential effects of the proposed action on special status species. BLM personnel also attended the 3 December 2002 meeting. A meeting with AGFD was held on 19 April 2002. Additional meetings were held with USFWS on 30 May, 6 November, and 10 December 2002, and 19 March, 16 May, 11 June, 14 July, and 11 September 2003, and 18 March 2004.

Table 2. Federally listed species that may occur near the proposed action.

SPECIES	STATUS	*DRAFT* DETERMINATION
Canelo Hills ladies' tresses	Endangered	No Effect
Cactus ferruginous pygmy-owl	Endangered	May affect, likely to adversely affect
Desert pupfish	Endangered	No Effect
Gila topminnow	Endangered	May affect, not likely to adversely affect
Huachuca water umbel	Endangered	No Effect
Jaguar	Endangered	May affect, not likely to adversely affect
Jaguarundi	Endangered	No Effect
Kearney's blue star	Endangered	No Effect
Lesser long-nosed bat	Endangered	May affect, likely to adversely affect
Masked bobwhite	Endangered	No Effect
Mexican gray wolf	Endangered	May affect, not likely to adversely affect
Nichols turk's head cactus	Endangered	No Effect
Northern aplomado falcon	Endangered	No Effect
Ocelot	Endangered	No Effect
Pima pineapple cactus	Endangered	May affect, likely to adversely affect
Sonoran pronghorn	Endangered	No Effect
Sonoran tiger salamander	Endangered	No Effect
Southwestern willow flycatcher	Endangered	May affect, not likely to adversely affect
Bald eagle	Threatened	No Effect
California brown pelican	Threatened	No Effect
Chiricahua leopard frog	Threatened	May affect, not likely to adversely affect
Loach minnow	Threatened	No Effect
Mexican spotted owl	Threatened	May affect, not likely to adversely affect
Sonora chub	Threatened	No Effect
Spikedace	Threatened	No Effect
Mountain plover	Proposed	No Effect
Gila chub	Proposed	No Effect

2.1 **MEXICAN SPOTTED OWL** (*Strix occidentalis lucida*) **(**Threatened)

2.1a Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. The action area for the MSO includes those areas of MSO habitat that may be directly impacted by construction as well as protected activity centers (PAC) within 1 mi (1.6 km) of the proposed action that may be subject to noise disturbance during construction. The entire action area for this species is within the Tumacacori EMA.

2.1b Natural History and Distribution

The MSO is one of three subspecies of spotted owl currently recognized by the American Ornithologists' Union in their most recent treatise on subspecies (A.O.U. 1957). However, Dickerman (1997), in a recent taxonomic review of *S. o. lucida*, has identified three subspecies throughout the species' range, including resurrecting the use of *S. o. huachucae* as the subspecies in the southwestern United States and northern Mexico. Although this new revision is probably valid, the currently accepted taxonomy was followed. The MSO (Figure 9) is a medium-sized owl with a round head lacking ear tufts; light brown to dark brown plumage, and dark eyes. It has white spots on the head and nape, and white mottling on the breast and abdomen; thus, the name spotted owl (Pyle 1997). All three subspecies of spotted owl inhabit mountainous, forested regions of western North America.

Figure 9. Mexican spotted owl.

A detailed account of the spotted owl, inclusive of the three currently recognized subspecies, is given by Gutiérrez et al. (1995). Ganey (1998) presents a synthesis of what is presently known about the MSO, particularly in Arizona. The MSO Recovery Plan (USFWS 1995a) and technical supporting chapters on distribution and abundance (Ward et al. 1995), population biology (White et al. 1995), landscape analysis and metapopulation structure (Keitt et al. 1995), habitat relationships (Ganey and Dick 1995), and prey ecology (Ward and Block 1995) also are important summary documents. The following brief species account was obtained from these and other more current references.

The MSO is widely but patchily distributed in forested mountains and canyons from southern Utah and central Colorado, south into Arizona, New Mexico, extreme western Texas, and into Mexico to near Mexico City (McDonald et al. 1991, Gutiérrez et al. 1995, Ward et al. 1995, Dickerman 1997). The MSO nests, roosts, forages, and disperses in a variety of habitats in Arizona from about 3,770 ft (1,236 m) to 9,600 ft (3,150 m). Nest and roost habitats include forests and woodlands that are structurally complex, unevenly aged and multistoried, with mature or old-growth stands containing trees older than 200 years with a high (>70 percent) canopy closure, including many snags and fallen logs (Ganey and Dick 1995). According to Ganey (1998), they appear to be most common in mature and old growth forests in steep canyons, but also are found in canyons that include prominent cliffs with little forested habitat. The MSO preys on small mammals, birds, reptiles, and insects, with woodrats (*Neotoma* spp.) and white-footed mice (*Peromyscus* spp.) constituting the bulk of its diet by biomass (Ward and Block 1995, Ganey et al. 1992, Reichenbacher and Duncan 1992).

Adult MSO are considered to have a relatively high survival rate, with an estimated probability of adult survival rate of 0.8 to 0.9 from one year to the next (White et al. 1995). Juveniles on the other hand, have a much lower survival probability rate, ranging from 0.06 to 0.29 (Ganey et al. 1998, White et al. 1995). There is a great deal of spatial and temporal variation in reproductive output, but one estimate places the general reproductive rate at 1.001 fledglings per pair (White et al. 1995). Typical of *K*-selected species (Ricklefs 1990), the MSO is long-lived with low reproductive output and generally maintains population densities near carrying capacity. The high survival rate of *K*-selected species enables MSO to maintain stable populations over time despite variable recruitment rates (White et al. 1995).

In 1993, the MSO was federally listed as a threatened species by the USFWS. The listing was based primarily on historical and ongoing habitat alteration due to timber management practices, specifically the use of even-aged silviculture, the threat of these practices continuing as prescribed in National Forest Plans, and the threat of additional habitat loss from catastrophic wildfire (USFWS 1993a).

The primary administrator of lands supporting MSO in the United States is the USFS. According to the recovery plan, 91 percent of MSO known to exist in the United States between 1990 and 1993 occurred on land administered by USFS (USFWS 1995a). The majority of known MSO have been found within Region 3 of the USFS, which includes 11 National Forests in New Mexico and Arizona. USFS Regions 2 and 4, including two National Forests in Colorado and three in Utah, support fewer MSO.

2.1c Critical Habitat

Critical habitat was designated for the MSO in 1995 (USFWS 1995b). However, it was revoked by court order in 1998 for failing to complete the National Environmental Policy Act process (USFWS 1998a). USFWS (USFWS 2000a) again proposed to designate 13.5 million acres (5.6 million ha), mostly on USFS land, as critical habitat for the species in 2000. The final rule published in the Federal Register on 1 February 2001 designated approximately 4.6 million acres (1.9 million ha) in Arizona, Colorado, New Mexico, and Utah on federal land outside of the USFS system (USFWS 2001a). The reason given for not designating critical habitat on USFS land was that current Forest Plans conform to management guidelines outlined in the recovery plan, which have undergone consultation with the USFWS, whereas other federal agencies have yet to formally adopt these guidelines.

On 13 January 2003, a federal judge stated that the USFWS final rule designating critical habitat for the MSO violated the ESA. On 18 November 2003, the USFWS again redesignated proposed critical habitat for the MSO, including unit BR-W-13 in the

Atascosa/Pajarito Mountains. The proposed action crosses this unit of proposed critical habitat.

2.1d Current Status Statewide

In Arizona, MSO have been documented throughout much of the state except for the arid southwestern portion. The greatest concentration of owls occurs along the Mogollon Rim from the White Mountains region to the peaks near Flagstaff and Williams (Ward et al. 1995, Ganey 1998). The majority of owls are located on federal lands managed by the USFS (USFWS 1995a).

There are three Recovery Units (RU) identified in Arizona. From north to south they are the Colorado Plateau, Upper Gila Mountains, and Basin and Range-West. No current estimate of the number of MSO within its entire range is available, but between 1990 and 1993, 103 MSO sites were recorded during planned surveys and incidental observations in the Basin and Range-West RU in Arizona (USFWS 1995a).

2.1e Environmental Baseline

The proposed action occurs in the Basin and Range - West RU. Within this RU, MSO are mainly associated with steep, rocky canyons containing cliffs and stands of oak, Mexican pine, and broad-leaved riparian vegetation (Ganey and Balda 1989). Most MSO habitat in this RU occurs on the CNF.

The proposed action passes through the Tumacacori EMA of the CNF, which currently contains five PACs. The majority of the EMA crossed by the proposed action is madrean evergreen woodland; however, much of it lacks the features typically associated with MSO habitat. Range condition in areas crossed by the proposed action is moderately high with a stable or unknown trend. Native grasses dominate groundcover throughout the action area, but some non-native species, such as Lehmann's lovegrass (*Eragrostis lehmanniana*), tree of heaven (*Ailanthus altissima*), and salt cedar (*Tamarix* spp.) occur within the EMA (USFS 2002). Lehmann's lovegrass was seeded in many areas to prevent erosion (Cox et. al. 1984) but has extended in range far beyond the seeded areas (Cox and Ruyle 1986).

Livestock stocking rates for the allotments within the Tumacacori EMA range from 1,320 Animal Unit Months (AUM) in the Peña Blanca Allotment to 2,400 AUMs in the Bear Valley Allotment. Allotment Management Plans for Bear Valley and Sardinia Allotments are currently being revised.

The proposed action passes within 0.56 mi (0.9 km) of the Pine Canyon PAC (#0502017), which lies south of Peck Canyon, which wa last informally monitored in 1998, with no information on MSO pair occupancy or no surveys since then. Additionally, CNF personnel received reports of MSO calling in Sycamore Canyon north of Ruby Road in 2001.

2.1f Effects of Proposed Action on the MSO and Proposed Critical Habitat

<u>Direct Effects</u>

Vehicle and Powerline Collisions

Because MSO are primarily nocturnal and likely will not be active during daylight when construction occurs, the probability of MSO collisions with construction related vehicles is extremely low. To minimize the risk of powerline collisions, TEP will construct the proposed transmission line following the guidelines outlined in "Suggested practices for raptor protection on powerlines: the state of the art in 1996" (APLIC 1996). While there is always some risk of a MSO collision with powerlines, raptors have lower rates of collision with powerlines than passerine birds (McNeil et al. 1985). This reduced collision rate may be due to visual acuity, maneuverability, and non-flocking tendencies (Nobel 1995). The risk of bird collisions with towers has been associated with birds being attracted to red lights used for aircraft avoidance (Kerlinger 2000). The towers used in the proposed action will not contain any lighting. No guy wires will be used in the construction of the proposed action, further reducing the potential for collisions.

Electrocution

Because power structures and towers are attractive perching and nesting sites for some raptor species, significant raptor mortality from electrocution has been reported in North America (Harness and Wilson 2000). Electrocution occurs when a bird simultaneously touches two phase conductors or a conductor and a ground wire (Bevanger 1994). Most electrocutions occur on distribution lines (34-kV or less) rather than on transmission lines (69-kV or more), primarily because clearances between wires on distribution lines are less and distribution lines have an array of uninsulated, structure-mounted equipment (Marti 2002). To minimize the risk of raptor electrocutions, TEP will construct the proposed transmission line following the guidelines outlined in "Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 1996" (APLIC 1996). Furthermore, on the structures to be used in the proposed action, the distance between the power lines is at least 18 ft (5.5 m). Because the average wingspan of an adult MSO is 3.3 ft (1 m), there is no foreseeable risk of electrocution.

Construction Noise and Activity

Human activity within breeding and nesting territories may affect some raptors by altering home range movements (Anderson et al. 1990) and causing nest abandonment (Postovit and Postovit 1987). Disturbance from construction activities may discourage MSO from foraging or nesting in suitable habitat. The greatest noise disturbance will result from the use of helicopters during installation of transmission lines; however, Delaney et al. (1999) found that MSO were disturbed more by ground-based disturbance, such as chain saws, than by helicopter overflights. Ground-based disturbance could result from heavy machinery or large groups of construction personnel working near MSO habitat.

To prevent the disturbance of breeding MSOs, no construction activities will occur within 1 mi (1.6 km) of the Pine Canyon PAC during the breeding season (1 March to 31

August), as outlined in the conservation measures (SECTION 1.4). Construction during the non-breeding season will be short term in duration.

Indirect Effects

Habitat Modification and Fragmentation

Because no construction will occur within a MSO PAC, no modification or fragmentation of MSO habitat is anticipated.

Increased Legal and Unauthorized Access to MSO Habitat

Incidental encounters between MSO and non-motorized recreationists are relatively insignificant in most cases (USFWS 1995a). Most MSO appear to be relatively undisturbed by small groups (< 12 people) passing nearby (USFWS 1995a) as long as the disturbance is not for an extended period of time. The potential for hikers to disturb MSOs is greatest where hiking is concentrated in narrow canyon bottoms occupied by nesting or roosting MSOs. Noise from recreationists using off-highway vehicles (OHV) on closed access roads are much more likely to disturb MSOs, especially if their activity occurs over an extended period of time in occupied MSO habitat. Increased access to MSO habitat may subject the species to poaching or other harassment.

The road closure techniques outlined in the RA (URS 2003) should minimize unintended use of temporary construction roads but probably will not prevent it entirely. However, because only a small segment of a construction road will occur within a PAC, and forest service roads already exist within the PAC, no significant increase in unauthorized vehicular access by recreationists into occupied MSO habitat is anticipated.

Accidental Wildfire

Because of their mobility, MSO will not likely be directly impacted by wildfires. However, fire suppression efforts over the past century have created a situation that may encourage catastrophic, large-scale fires. Efforts to limit such fires are of great importance to MSO conservation. Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). The short-term effects of wildfires may affect MSO prey species through direct mortality from the fire or habitat destruction. Herbaceous plant species that serve as cover and forage for small mammals could be drastically reduced. However, because of reduced groundcover, predation upon surviving small mammals by MSO may actually increase in the short term. Furthermore, increased herbaceous production in the years following a fire may improve habitat for small mammals.

New roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak efficacy in southern California came to similar conclusions (Green 1977).

If deemed appropriate, new roads may allow fuelwood collection in areas currently not accessible, thereby reducing the density of down woody material, which is capable of carrying wildfires across the landscape. Furthermore, the measures being developed for the Fire Prevention Plan will minimize the risk of wildfire associated with the proposed action.

Invasive Species

Roads may be the first point of entry for invasive species into a new landscape and may serve as a corridor along which plants move farther into the landscape (Lonsdale and Lane 1994, Greenberg et al. 1997). The short lengths of new access roads, their distance from MSO habitat, as well as the measures outlined in the Invasive Species Management Plan, will minimize the introduction or spread of invasive species into MSO habitat.

Effects to Proposed Critical Habitat

While the proposed action passes through the boundaries of proposed critical habitat unit #BR-W-13, (Figure 20) the area where the project is located does not contain constituent elements as outlined in the 2001 critical habitat designation (USFWS 2001e).

The proposed action includes the placement of 14 structures and 12,137 linear feet (3,700 m) of new roads within unit BR-W-13 of proposed critical habitat. Therefore, the proposed Central Corridor would permanently disturb 3.4 acres (1.4 ha) and temporarily disturb 10.1 acres (4 ha) of land within proposed MSO critical habitat. These calculations are based on the assumptions listed in the Final Roads Analysis (Section 1.4) (URS 2003), including: (1) temporary disturbance at structure locations would occur in an area within a 100-foot (30.5-m) radius; (2) laydown areas were calculated as temporary disturbance; (3) the permanent area of disturbance at each structure site as 25 ft^2 (2.3 m^2); (4) proposed new roads would be maintained for maintenance (and thus were permanent disturbance); and (5) the average width of proposed new roads would be 12 feet (3.7 m) wide.

Because the action area does not contain constituent elements of proposed critical habitat, and the conservation measures outlined above will minimize the impacts from accidental wildfire and invasive species, the impacts from the proposed action will not appreciably diminish the value of the proposed critical habitat to the survival and recovery of MSO.

2.1g Cumulative Effects

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. Because the action area for this species lies entirely on USFS land, all activities are managed according to the MSO recovery plan guidelines, and future actions will be subject to the consultation requirements established under Section 7, and are not considered cumulative to the proposed action.

Although the amount of future private development within Santa Cruz County is unknown, many rural areas of Arizona are experiencing substantial growth. Between

1990 and 2000, Santa Cruz County grew by 29.3 percent (U.S. Census Bureau 2000). Despite its distance from the MSO action area, an increase in population in Nogales, and other regional population centers may translate into an increased demand for outdoor recreation, and therefore more recreational use of USFS land.

An undetermined level of border crossings by undocumented immigrants (UDI) occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase.

2.1h Effects Determination and Incidental Take

Effects to the Species

Construction noise and activities may affect non-breeding MSO but is not likely to adversely affect the species, because construction will occur during a non-critical life stage and will be short term in duration.

Because the proposed action is not likely to adversely affect the MSO, no take is anticipated.

Effects to Critical Habitat

Removal of some vegetation in PAC #0502015 may affect, but is not likely to adversely modify proposed critical habitat for the MSO.

2.2 CACTUS FERRUGINOUS PYGMY-OWL *(GLAUCIDIUM BRASILIANUM CACTORUM)* (Endangered)

2.2a Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. The action area for the CFPO includes those areas of habitat below 4,000 ft (1,219 m) that may be directly impacted by construction as well as potential nesting sites within 1,312 ft (400 m) of the proposed action (USFWS 2000) that may be subject to noise disturbance during construction. In addition, an 7.08 mi (11.4 km) buffer area surrounding the project area is included in the action area because juvenile CFPO have been documented traveling up to 7.08 mi (11.4 km) during dispersal (M. Wrigley, USFWS, pers. comm., May 2001).

2.2b Natural History and Distribution:

USFWS listed CFPO in Arizona on 10 March 1997 (USFWS 1997a) as endangered. Listing was based on historical and current evidence that suggested a significant population decline of this subspecies had occurred in Arizona. USFWS considered the loss and alteration of habitat as the primary threat to the remaining population. A recovery plan for the species is currently in development by the CFPO recovery team.

CFPO (Figure 10) are small brown birds, with a cream-colored belly streaked with paler brown (Pyle 1997). The *cactorum* race; however, is described as "a well-marked, pale grayish extreme for the species" (Phillips et al. 1964). The call for this mostly diurnal owl is heard chiefly near dawn and dusk. The best field identification features are its small size, eyespots on the nape of the neck, and long reddish-barred tail, which is often nervously wagged or twitched (Monson 1998).

Figure 10. Cactus ferruginous pygmy-owl.

Originally CFPO were described as a separate subspecies based on specimens from Arizona and Sonora, Mexico. CFPO were first documented in the United States from a collection by Lieutenant Charles E. Bendire on 24 January 1872 in the "heavy mesquite thickets along Creek" near the present day site of historic Camp Lowell, Tucson (Coues 1872, Bendire 1892).

Very little is known about the life history of CFPO in Arizona (Cartron et al. 2000a). Little or no literature currently exists concerning life history variables such as longevity, age distribution, and recruitment. Current studies undertaken by AGFD, USFWS, and The University of Arizona are examining these variables.

The diet of CFPO is not well understood, but they are believed to be prey generalists (Cartron et al. 2000a). Observations, stomach content analysis, and records of Texas pygmy-owls suggest that these owls have a diverse diet that includes mammals, birds, reptiles, and insects (Proudfoot and Beasom 1997).

CFPO nest in cavities of larger trees (typically defined as a tree with a trunk at least 6 in [15 cm] diameter at breast height [DBH]) or large columnar cactus. Cavities may be naturally formed (e.g. knotholes) or excavated by woodpeckers. CFPO do not construct their own nest holes. All currently known CFPO nest sites in Arizona are in woodpecker excavated cavities in saguaros. Historically, the species also has been documented nesting in cottonwood, paloverde, and mesquite trees in Arizona.

Nesting activity for this owl species in Arizona begins in late winter to early spring (Lesh and Corman 1995, Abbate et al. 1996). Little is known about its courtship flight behavior. Egg laying begins by late April with three to four eggs typically laid. It is uncertain if only one brood is hatched per year. Nestlings have been observed through the end of July. During nesting, the male brings food to the female and young (Glinski 1998).

Historically, CFPO occurred from the lowlands of central Arizona, south through western Mexico to the states of Colima and Michoacan, and from southern Texas south through the Mexican states of Tamaulipas and Nuevo Leon. In Arizona, the species was documented as far north as New River and Cave Creek in northern Maricopa County (Harris and Duncan 1999). Elsewhere in Maricopa County, the species has been found near the Yuma County line along the Gila River at Agua Caliente, along the Salt River at Phoenix, and near the Verde River confluence. The eastern most verifiable record was along the Gila River at Old Fort Goodwin, located approximately 2 mi (1.2 km) southwest of present day Geronimo, Graham County, Arizona (Aiken 1937). In the southeastern part of the state, the species has been documented in recent times near Dudleyville along the lower San Pedro River between 1985 and 1987 (Harris and Duncan 1999), and probably also along lower Aravaipa Creek in 1987 (Monson 1987). Other localities in south central Arizona include historical records in Pinal County near Sacaton and Blackwater on the Gila River Indian Reservation, and at Casa Grande (Harris and Duncan 1999). Near the Mexican border, the species has been found in Santa Cruz County near Patagonia and in Sycamore Canyon west of Nogales. A likely accidental sighting was documented once on 10 April 1955 in eastern Yuma County near the Mexican border at Cabeza Prieta Tanks on the Cabeza Prieta National Wildlife Refuge (Monson and Phillips 1981, Harris and Duncan 1998).

Surveys conducted by University of Arizona biologists in Sonora, Mexico found 280 CFPO during the 2000 survey season. CFPO within Sonora, Mexico and Arizona may have been the same population prior to agricultural expansion within the last 75 years. However, due to isolation, the genetic connection of the Arizona population to owls in the nearby state of Sonora, Mexico may be tenuous (USFWS 2002a).

CFPO have been documented in several habitat types in the northern portion of its range in Arizona and adjacent Mexico. In Arizona, these include streamside Sonoran riparian deciduous forest and woodland associations and Sonoran desertscrub. CFPO also inhabit Sinaloan deciduous forest and thornscrub in Mexico (not discussed here). The streamside associations include such species as cottonwood, ash, netleaf hackberry, willows, velvet mesquite, and others. The Sonoran desertscrub associations are composed of relatively dense saguaro cactus stands associated with short trees such as paloverde, mesquite, and ironwood (*Olneya tesota*), and an open understory of triangle-leaf bursage, creosote, and various other cacti and shrubs. Throughout its range, CFPO occur at low elevations, generally below 4,000 ft (1,219 m).

CFPO found in Sonoran desertscrub habitats are typically associated with structurally diverse stands of desert riparian scrub with saguaros along washes (Wilcox et al. 2000). Such habitat is often referred to as xeroriparian vegetation (Johnson and Haight 1985). These washes have no permanent water flow. Instead, flow is intermittent and based on seasonal rainfall as well as strength and duration of individual storms. Desert riparian scrub vegetation is easily recognizable by the presence of a linear assemblage of trees and shrubs that grow along the wash. Density is higher and taller than the sparse desertscrub vegetation that typically exists in the adjacent uplands. Before listing the species as endangered, all known CFPO were documented in such Sonoran desertscrub habitat (Lesh and Corman 1995, Abbate et al. 1996).

At the northern periphery of the subspecies range in southern Arizona, CFPO distribution and preferred habitat is not well understood. It is believed CFPO require the cover of denser wooded areas with understory thickets, like riparian habitat, for nesting, foraging, and predator avoidance (Abbate et al. 2000). Riparian habitat also is known for its high density and diversity of animal species that constitute the prey base of CFPO.

A significant decline in the Arizona population has occurred over the past several decades (USFWS 1997a, Richardson et al. 2000). Loss or modification of habitat from woodcutting, agriculture, groundwater pumping, and related human activities has presumably contributed to the population decline (USFWS 1997a).

2.2c Critical Habitat

On 12 July 1999, USFWS designated approximately 731,712 acres (296,113 ha) of critical habitat supporting riverine, riparian, and upland vegetation in seven critical habitat units, located in Pima, Cochise, Pinal, and Maricopa counties of Arizona (USFWS 1999). However, on 21 September 2001, the U.S. District Court for the State of Arizona vacated this final rule designating critical habitat for CFPO, and remanded its designation back to the USFWS for further consideration. On 27 November 2002, USFWS proposed designating 1.2 million acres (485,000 ha) of critical habitat for CFPO in southern Arizona (Federal Register Vol. 67, No 229:71031-71064). The proposed action does not enter any areas proposed as critical habitat.

2.2d Current Status Statewide

USFWS determined that CFPO in Arizona were endangered because of the following factors (USFWS 1997a):

- present or threatened destruction, modification, or curtailment of its habitat or range;
- inadequacy of existing regulatory mechanisms;

- other natural and manmade factors, which include low genetic viability.

Surveys conducted statewide during the 2002 season confirmed a total of 18 adult CFPO and three nests in Arizona. Similar to the previous four years, there was greater than 50 percent fledgling mortality documented in 2002, with only one juvenile confirmed surviving dispersal (S. Richardson, USFWS, pers. comm., 3 December 2002).

One of most urgent threats to CFPO in Arizona is thought to be the loss and fragmentation of habitat (USFWS 1997a, Abbate et al. 1999). The complete removal of vegetation and natural features required for many large-scale and high-density developments directly and indirectly impacts CFPO survival and recovery (Abbate et al. 1999). In recent decades, CFPO riparian habitat has continually been modified and destroyed by agricultural development, woodcutting, urban expansion, and general watershed degradation (Phillips et al. 1964, Brown et al. 1977, State of Arizona 1990, Bahre 1991, Stromberg et al. 1992, Stromberg 1993a and 1993b). Sonoran desertscrub has been affected to varying degrees by urban and agricultural development, woodcutting, and livestock grazing (Bahre 1991). Pumping of groundwater and the diversion and channelization of natural watercourses are also likely to have reduced CFPO habitat.

Proudfoot and Slack (2001) found that CFPO in northwestern Tucson may be isolated from other populations in Arizona and Mexico. Low genetic variability can lead to a reduction in reproductive success and environmental adaptability. In 1998 and 1999, two cases of sibling CFPO pairing and breeding were documented (Abbate et al. 1999). In both cases, young were fledged from the nesting attempts. These unusual pairings may have resulted from extremely low numbers of available mates within dispersal range, and/or from barriers (including fragmentation of habitat) that have influenced dispersal and limited the movement of young owls (Abbate et al. 1999).

Soule (1986) notes that very small populations are in extreme jeopardy due to their susceptibility to a variety of factors, including variations in birth and death rates that can result in extinction. In small populations such as with CFPO, each individual is important for its contribution to the genetic variability of that population.

2.2e Environmental Baseline

CFPO habitat north of Sahuarita Road consists of Sonoran desertscrub with relatively high species diversity and structural diversity, including scattered saguaro cacti containing potential nesting cavities. This area is within Survey Zone 1 (USFWS 2000) and has the highest potential for occupancy of the entire action area. Land status in this area is a mixture of private and state land. The Mission Mine Complex also is located within this section of the proposed action and grazing occurs on much of the state lands in the area.

CFPO habitat south of Sahuarita Road consists primarily of semi-desert grassland dominated by mesquite and acacia trees, mixed-cacti, ocotillo, yucca, and grasses, including non-native Lehmann's lovegrass (*Eragrostis lehmanniana*). The area is primarily undeveloped, but does contain some existing electrical distribution lines and associated roads (Figure 11) as well as low density housing developments. These grasslands are transected by desert riparian scrub dominated by mesquite and netleaf hackberry trees. Some areas of deciduous riparian forests are also found south of Arivaca Road in Sopori Wash and Peck Canyon. Land jurisdictions in this area include private, state, BLM, and USFS.

Figure 11. Example of existing disturbance within the corridor.

CFPO surveys were conducted by Harris Environmental Group, Inc. (HEG) biologists in 2001 and 2002 (data previously submitted to USFWS) in accordance with the approved protocol (USFWS 2000). Surveys were conducted in Sonoran desertscrub habitat where saguaros were present and in desert riparian scrub and deciduous riparian habitats that contained large trees (over 6 in [15.2 cm] DBH). No surveys have been conducted in deciduous riparian habitat within Sopori Wash and Peck Canyon. Surveys were conducted at 142 call points in 2001 and 140 in 2002. No CFPOs were detected during either survey year.

The only historical records of CFPO within the Nogales Ranger District (RD) of the CNF are in Sycamore Canyon (CNF 2000) and a dispersing juvenile in the Jarillas Alloment. USFS surveys in Sycamore Canyon in 1997 and 1998 did not locate CFPO. Additionally, USFS personnel surveyed 2,300 acres (930 ha) in 1999 with negative results and conducted 58 habitat assessments for CFPO habitat (CNF 2000). The habitat assessments identified four areas that ranked high enough to warrant CFPO surveys. No CFPO have been detected during surveys of these four areas (T. Newman, CNF, pers. comm., 9 October 2002).

2.2f Effects of Proposed Action on the CFPO

Direct Effects

Vehicle and Powerline Collisions

CFPO collisions with windows and fences have been documented in the Tucson area (USFWS 2002a), and observations of low flying CFPO across roadways indicate vehicle collisions are a realistic hazard (Abbate et al. 1999). While CFPO may be active during daylight, no CFPO have been detected within the action area, therefore, CFPO collisions with construction related vehicles are unlikely.

There is a small risk of a CFPO collision with power lines, however, raptors have lower rates of collision with power lines than passerine birds (McNeil et al. 1985). This reduced collision rate may be due to the visual acuity, maneuverability, and non-flocking tendencies (Nobel 1995). To minimize the risk of powerline collisions, TEP will construct the proposed transmission line following the guidelines outlined in "Suggested

Practices for Raptor Protection on Power Lines: the State of the Art in 1996" (APLIC 1996).

Electrocution

Because power structures and towers are attractive perching and nesting sites for some raptor species, significant raptor mortality from electrocution has been reported in North America (Harness and Wilson 2000). Electrocution occurs when a bird simultaneously touches two phase conductors or a conductor and a ground wire (Bevanger 1994). Most electrocutions occur on distribution lines (34-kV or less) rather than on transmission lines (69-kV or more), primarily because clearances between wires on distribution lines are less and distribution lines have an array of uninsulated, structure-mounted equipment (Marti 2002). To minimize the risk of raptor electrocutions, TEP will construct the proposed transmission line following the guidelines outlined in "Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 1996" (APLIC 1996). Furthermore, on the structures to be used in the proposed action, the distance between the power lines is at least 18 ft (5.5 m). Because the average wingspan of an adult CFPO is 15 in (38 cm), there is no foreseeable risk of electrocution.

Construction Noise and Activity

Although no CFPO have been detected in the project area, short term noise disturbance and human activity associated with construction may discourage CFPO from using habitat within and adjacent to the proposed ROW. Human activity near nest sites at critical periods of the nesting cycle may cause CFPO to abandon their nests (USFWS 2002a). While CFPO may tolerate low level noise disturbances, such as those in low density residential areas (Cartron et al. 2000b), they will probably not tolerate noise levels associated with construction activities in close proximity to a nest. The greatest likelihood of noise disturbance will result from the use of helicopters during the installation of the transmission lines, but also could result from the presence of heavy machinery or large groups of construction personnel. If CFPO are not detected during the two consecutive years of protocol surveys, the potential for direct impacts to this species is minimal.

<u>Indirect Effects</u>

Habitat Modification and Fragmentation

The proposed action will result in the disturbance of areas that could provide potential nesting, foraging, and dispersal habitat for CFPO. Under the proposed action, the following amounts of temporary (laydown areas, tensioning and pulling sites) and permanent (proposed new roads and structure bases) habitat disturbance would occur:

Sonoran Desertscrub:	Temporary = 38.9 acres
	Permanent = 4.9 acres
Desert Riparian Scrub:	Temporary = 29.4 acres
	Permanent = 3.6 acres
Deciduous Riparian	Temporary = 0.14 acres

While all large saguaros within construction sites will be transplanted, construction could temporarily degrade CFPO habitat by removing vegetation that provides forage and shelter. Elimination of groundcover plant species, rodent burrows, and native soils, as well as loss of trees and shrubs, may impact local reptile and bird populations that are important to the pygmy-owl diet. Loss of complex vegetation structure increases energy demands on owls that must forage at greater distances and risk exposure to a variety of hazards (Abbate et al. 1999). Because of the linear nature of the proposed action, these impacts will be widely distributed and relatively minor in any single area.

Increased Legal and Unauthorized Access to CFPO Habitat
Although CFPO have not been detected in the project area, recreationists may access potential CFPO habitat using temporary construction roads associated with the proposed action. While hikers and other non-motorized recreationists will create minimal disturbance, noise from Off Highway Vehicle (OHV) users are much more likely to disturb CFPO, especially if the activity occurs over an extended period of time in or near a CFPO nesting territory. Increased access to CFPO habitat may subject the species to poaching or other harassment. While TEP will prevent unauthorized access to the ROW across private land, closure of the ROW on public land, particularly state land, is not feasible. Therefore, some increase in access to potential CFPO habitat is anticipated.

Accidental Wildfire
Increased road access may contribute to an increase in the frequency of human caused ignitions in some areas (Gucinski et al. 2001). Because of their mobility, CFPO will not likely be directly impacted by wildfires. However, wildfires may destroy columnar cacti and trees that provide nesting cavities as well as affect CFPO prey species through direct mortality from the fire or habitat destruction. Herbaceous plant species that serve as cover and forage for small mammals could be drastically reduced. Because of reduced groundcover, predation upon surviving small mammals by CFPO may actually increase in the short term. Furthermore, increased herbaceous production in the years following a fire may improve habitat for small mammals in the long term.

New roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak effectiveness in southern California came to similar conclusions (Green 1977).

The measures outlined in the Fire Prevention Plan will minimize the risk of wildfire associated with the proposed action.

Invasive Species

Roads may be the first point of entry for invasive species into a new landscape and may serve as a corridor along which plants move farther into the landscape (Lonsdale and Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move away from the roadside into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires. An increased risk of fire in CFPO habitats could be detrimental to the species because it would eliminate essential features, such as saguaros and desert tree species, which are not fire adapted. Fire stimulates Lehmann's lovegrass, which in turn stimulates more fire, the result is an increase in the fire return interval at the expense of native plant species (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.2g Cumulative Effects

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this biological assessment. While the action area for this species crosses private, state, and federal lands, the habitat with the highest potential for occupancy by CFPO occurs on state and private lands in Pima County. Future federal actions on these lands will be subject to Section 7 consultation. These actions will not be considered cumulative.

Although the amount of future private development within the action area is unknown, many rural areas of Arizona are experiencing substantial growth. Pima County grew by 26.5 percent between 1990 and 2000 (U.S. Census Bureau 2000). Because of the growth rate and the development pressures from nearby Tucson and Sahuarita, it is foreseeable that land adjacent to the proposed ROW will be developed. These developments will likely include increases in associated infrastructure such as roads, groundwater use, and commercial services, all resulting in the degradation of CFPO habitat.

An undetermined level of border crossings by UDI occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase. Additionally, agriculture, recreation, OHV use, grazing, and other activities continue to occur on private and state land and adversely affect CFPO and their habitats.

2.2h Effects Determination and Incidental Take

While CFPO are not currently known to occupy the action area, the disturbance of potential habitat from construction activities and increased access may affect, and are likely to adversely affect, this species.

Take of CFPO is not anticipated because construction activities during breeding season will only occur following protocol surveys and the Conservation Measures outlined in SECTION 1.4 will minimize disturbance to potential habitat and prevent disturbance to nesting CFPO within the action area should any be detected in the future.

2.3 SOUTHWESTERN WILLOW FLYCATCHER *(Empidonax traillii extimus)* (Endangered)

2.3a Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. Potential migratory habitat for the SWFL includes those areas of Sopori Wash with dense riparian habitat similar to that described by Sogge et al. (1997) that may be directly or indirectly impacted by construction. The action area for this consists of the Sopori Wash both within the proposed ROW as well as the surrounding Sopori Wash watershed.

2.3b Natural History and Distribution

SWFL (Figure 12) are small passerine bird (Order Passeriformes; Family Tyrannidae) measuring approximately 5.75 in (14.6 cm) in length from the tip of the bill to the tip of the tail and weighing only 0.4 ounces (11.34 grams). This species has a grayish-green back and wings, whitish throat, light gray-olive breast, and pale yellowish belly. Two white wingbars are visible (juveniles have buffy wingbars). The eye ring is faint or absent. The upper mandible is dark and the lower is light yellow grading to black at the tip. SWFL are riparian obligate species, nesting along rivers, streams, and other wetlands where dense growths of willow, seepwillow (*Baccharis* sp.), buttonbush (*Cephalanthus* sp.), boxelder (*Acer negundo*), saltcedar (*Tamarix* spp.), carrizo (*Phragmites australis*) or other plants are present, often with a scattered overstory of cottonwood and/or willow.

Figure 12. Southwestern willow flycatcher.

One of four currently recognized willow flycatcher subspecies (Phillips 1948, Unitt 1987, Browning 1993), SWFL are neotropical migratory species that breed in the southwestern U.S. from approximately 15 May to 1 September. This species migrates to Mexico, Central America, and possibly northern South America during the non-breeding season (Phillips 1948, Stiles and Skutch 1989, Peterson 1990, Ridgely and Tudor 1994, Howell and Webb 1995). The historical range of SWFL included southern California, Arizona, New Mexico, western Texas, southwestern Colorado, southern Utah, extreme southern Nevada, and extreme northwestern Mexico (Sonora and Baja) (Unitt 1987).

SWFL breed in dense riparian habitats from sea level in California to just over 7,000 ft (2,134 m) in Arizona and southwestern Colorado. Historic egg/nest collections and species descriptions throughout SWFL range describe the widespread use of willow for nesting (Phillips 1948, Phillips et al. 1964, Hubbard 1987, Unitt 1987, San Diego Natural History Museum 1995). Currently, SWFL primarily use Geyer willow (*Salix geyeriana*), Goodding willow (*Salix gooddingii*), boxelder, saltcedar, Russian olive (*Elaeagnus angustifolio*), and live oak (*Quercus agrifolia*) for nesting. Other plant species less commonly used for nesting include: buttonbush, black twinberry (*Lonicera involucrata*), cottonwood, white alder (*Alnus rhombifolia*), blackberry (*Rubus ursinus*), carrizo, and stinging nettle (*Urtica* spp.). Nesting SWFL exhibit a strong preference for dense vegetation at the nest site, but high variation and density of vegetation at the patch scale (Hatten et al. 2000). Nesting sites are typically close to the edge of the vegetation patch and close to water (Allison et al. 2000). Based on the diversity of plant species composition and complexity of habitat structure, four basic nesting habitat types can be described for SWFL: monotypic willow, monotypic exotic, native broadleaf dominated, and mixed native/exotic (Sogge et al.1997).

Open water, cienegas, marshy seeps, or saturated soil are typically in the vicinity of SWFL territories and nests; SWFL sometimes nest in areas where nesting substrates are in standing water (Maynard 1995, Sferra et al. 1995, 1997). Hydrological conditions at a particular site can vary remarkably in the arid southwest within a season and between years. At some locations, particularly during drier years, water or saturated soil is only present early in the breeding season (i.e., May and part of June). However, the total absence of water or visibly saturated soil has been documented at several sites where the river channel has been modified (e.g. creation of pilot channels), where modification of subsurface flows has occurred (e.g. agricultural runoff), or as a result of changes in river channel configuration after flood events (Spencer et al. 1996). Throughout their range, SWFL arrive on breeding grounds in late April and May (Sogge and Tibbitts 1992, Sogge et al. 1993, Sogge and Tibbitts 1994, Muiznieks et al. 1994, Maynard 1995, Sferra et al. 1995, 1997). Nesting begins in late May and early June, and young fledge from late June typically through mid August, but as late as early September.

SWFL are insectivores, foraging in dense shrub and tree vegetation along rivers, streams, and other wetlands. Flying insects are the most important SWFL prey item; however, they will also glean larvae of non-flying insects from vegetation (Drost et al. 1998). Drost et al. (1998) found that the major prey items of SWFL (in Arizona and Colorado), consisted of true flies (Diptera); ants, bees, and wasps (Hymenoptera), and true bugs (Hemiptera). Other insect prey taxa include leafhoppers (Homoptera: Cicadellidae), dragonflies and damselflies (Odonata); and caterpillars (Lepidoptera larvae). Non-insect prey include spiders (Araneae), sowbugs (Isopoda), and fragments of plant material.

2.3c Critical Habitat

Critical habitat for SWFL was originally designated on 22 July 1997 (USFWS 1997b), but on 11 May 2001, the 10th Circuit Court of Appeals set aside the critical habitat designation and instructed USFWS to issue a new designation in compliance with the court ruling. USFWS is currently soliciting information regarding areas important for the conservation of this species in order to re-propose critical habitat.

2.3d Current Status Statewide

The following status of SWFL in Arizona was summarized from Smith et al. (2002). In 2001, 177 sites covering approximately 139 mi (225 km) of riparian habitat were surveyed for SWFL in Arizona. Sites range from 98 ft (30 m) to 8,802 ft (2,683 m) in elevation and 98.5 ft (30 m) to 10 mi (16.1 km) in length. The mean site length was 1 mi (1.6 km). Fifty-two of the 177 sites were not surveyed according to protocol. This was due to time or funding limitations or because unsuitable SWFL habitat was found during the first survey. Of the 177 sites, 20 had not been previously surveyed. Most new survey sites were located along the Colorado River (n = 9) and Gila River (n = 4). Six hundred thirty-five resident SWFL were documented within 346 territories at 46 sites. AGFD personnel and statewide cooperators recorded 311 pairs.

SWFL were documented along 11 drainages. The greatest concentrations of SWFL were found at Roosevelt Lake (40 percent) and the Winkelman Study Area (35 percent). Resident SWFL were detected at five sites that had been surveyed at least once in previous years. Resident SWFL were documented in two drainages (Virgin River and Cienega Creek) for the first time since protocol surveys began. No historical occurrence record exists for SWFL along the Virgin River and SWFL have not been reported at Cienega Creek since 1964. These colonizations yield evidence of habitat restoration potential in these drainages that can aid in recovery of the SWFL.

2.3e Environmental Baseline

The section of Sopori Wash crossed by the proposed action supports a mixed riparian assemblage with mature but discontinuous Fremont cottonwood, netleaf hackberry along the banks, and a midstory of large mesquite (Figure 13) (HEG Field Notes, C. Hisler, AGFD, pers. comm., 18 July 2002). Understory density is relatively low. Uplands surrounding Sopori Wash are characterized by semidesert grasslands and appear to be subject to grazing.

Figure 13. Riparian habitat in Sopori Wash

This reach of Sopori Wash is ephemeral and water is probably present only for short periods of time following precipitation events. Because of the patchy habitat and lack of surface water, this area would likely be used only by migratory SWFL.

The perennial areas within Peck Canyon support small clusters of ash, walnut, and netleaf hackberry, but the density of understory vegetation necessary for SWFL is generally

Figure 14. Riparian vegetation in Peck Canyon.

lacking (Figure 14). Semidesert grasslands that are subject to grazing characterize the uplands surrounding Peck Canyon. Because of the lack of habitat structure, this area likely would not function as SWFL habitat.

The nearest recent (1999) reports of SWFL are from the Santa Cruz River between Tubac and Rio Rico, approximately 6-12 mi (10-20 km) away (McCarthey et al. 1998, Paradzick et al. 1999, Paradzick et al. 2000). All of these reports were of migrant SWFL.

2.3f Effects of Proposed Action on the SWFL

<u>Direct Effects</u>
Because the proposed action does not impact suitable breeding habitat, no direct impacts to SWFL are anticipated.

<u>Indirect Effects</u>
Habitat Modification and Fragmentation
Indirect impacts to SWFL may result from modifications to potential migratory habitat from the installation of three structures and associated construction within the Sopori Wash floodplain. Roads in Sopori Wash will be limited to a width of 12 ft (4 m), which when combined with structure installation sites, will result in the disturbance of 2.58 acres (1.04 ha) of SWFL habitat. Because disturbed cottonwood and willow specimens will be mitigated at a 2:1 ratio and riparian vegetation can recover quickly following minimal disturbance, any adverse effects to SWFL habitat will be temporary.

Increased Legal and Unauthorized Access to SWFL Habitat
This section of Sopori Wash is on a private ranch, therefore, unauthorized recreational access to Sopori Wash via temporary construction roads associated with the proposed action will be minimized. Therefore, no disturbance of SWFL or habitat modification from increased access is anticipated.

Accidental Wildfire
Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). However, because new roads in this area would not be open to the public, increased risk of wildfire because of increased access will be negligible. The measures outlined in the Fire Prevention Plan will minimize the risks of wildfires associated with the proposed action.

Invasive Species

Roads may be the first point of entry for invasive species into a new landscape and may serve as a corridor along which plants move farther into the landscape (Lonsdale and Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move away from the roadside into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires. An increased risk of fire in CFPO habitats could be detrimental to the species because it would eliminate essential features, such as saguaros and desert tree species, which are not fire adapted. Fire stimulates Lehmann's lovegrass, which in turn stimulates more fire, the result is an increase in the fire return interval at the expense of native plant species (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.3g Cumulative Effects

Cumulative effects include the effects of future state, local or private actions that are reasonably certain to occur in the action area considered in this biological assessment. Most land within the action area consists primarily of ASLD lands with blocks of private parcels on either side of Arivaca Road. Federal actions would on these lands be subject to Section 7 consultation; these actions would not be considered cumulative.

Although the amount of planned private development within the action area is unknown, many rural areas of Arizona are experiencing substantial growth. Between 1990 and 2000, Pima County grew by 26.5 percent and Santa Cruz County by 29.3 percent (U.S. Census Bureau 2000). Because of these growth rates and the trend of rural development to occur in areas with some existing infrastructure, it is foreseeable that the private ranches adjacent to Arivaca Road could be sold and subdivided for residential homes and ranchettes. Any substantial population increase in the area also could increase demands for access to recreational land, increase groundwater pumping, and foster the development of commercial services. These impacts to the watershed could degrade the value of habitat within Sopori Wash preventing its use by a variety of species.

An undetermined level of border crossings by UDI occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase into the foreseeable future.

2.3h Effects Determination and Incidental Take

The disturbance of potential migratory habitat may affect the SWFL, but it is not likely to adversely affect the species because the disturbance will be relatively small in area and temporary.

Because the proposed action is not likely to adversely affect the species, no take of SWFL is anticipated.

2.4 LESSER LONG-NOSED BAT *(Leptonycteris curasoae yerbabuenae)* (Endangered)

2.4a Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. Potential roosting habitat for LLNB occurs in the Tumacacori and Atascosa/Pajarito mountains, and foraging habitat occurs through those portions of the proposed ROW that contain agave and saguaro cacti. Because LLNB have been documented foraging up to 40 mi (64 km) from roost sites, the action area for the LLNB consists of all potential foraging and roosting habitat within a 40 mi (64 km) buffer surrounding the proposed action.

2.4b Natural History and Distribution

LLNB (formerly Sanborn's long-nosed bat) are one of three members of American leaf-nosed bats (Family Phyllostomidae) in Arizona (Hoffmeister 1986). LLNB (Figure 15) is one of the larger Arizona bats, gray to reddish brown in color. This bat has an erect triangular flap of skin (nose leaf) at the end of a long slender nose. LLNB can be distinguished from *Macrotus* by a much longer nose, greatly reduce tail membrane, and smaller ears; and from *Choeronycteris,* which has a shorter tail, larger tail membrane, and longer, narrower nose than LLNB.

Figure 15. Lesser long-nosed bat.

LLNB occur from the southern United States to northern South America, including several islands and the adjacent mainland of Venezuela and Colombia. LLNB are found between 4 degrees to 32 degrees N latitude in semiarid to arid conditions (Nowak 1994). This bat is typically associated with their primary food source, flower nectar and fruit of columnar cacti, and flower nectar of certain agave species. Because of the seasonal nature of their food source, they must migrate to follow flowering and fruiting plants. In addition to food availability, there must be suitable roosting within commuting distance of the food source. Currently, the longest known commute distance is about 48 km (30 mi).

The primary range of this bat lies in Mexico and Central America. Occurrences in Arizona probably represent range expansion. Prior to the 1930s, there are no records of LLNB in Arizona (Cockrum 1991). Colossal Cave and the Old Mammon Mine are the most northern sites known to house colonies of these bats. However, these sites support colonies of about 5,000 individuals, versus sites in Mexico, which are as large as 150,000 individuals.

LLNB have a bi-seasonal occurrence in Arizona. The maternity season, when bats migrate to southwestern Arizona, represents a United States population of about 30,000 individuals. The other is the fall agave flowering season, located in southeastern Arizona, which attracts about 70,000 bats. Each of these areas contains three known primary roosts and some number of secondary/transient or night roosts (sheltering ten to a few hundred individuals/site).

With the exception of a small bachelor roost located in the Chiricahua Mountains, all remaining records represent small numbers (usually single individuals) at hummingbird feeders, caught in mist nets, or chance findings in residential areas. Constantine (1966) reported two immature females from Maricopa County, one in Phoenix on 30 August 1963 and the other in Glendale on 16 September 1963. The Glendale specimen was found dead. The other was hanging on a screen door (not a normal place) indicating something was likely wrong with that bat. He also reported two males from southern California: one was taken alive on 3 October 1993 outside a home in Yucaipa, the other was taken on 18 October 1996 from the outside of a building in Oceanside (Constantine 1998). LLNB also have been reported from the Aravaipa Canyon area (Cockrum 1991). Hoffmeister (1986) has a record in the Santa Catalina Mountains, but Cockrum (1991) states it was probably a transcription error because the nectar-feeding bats found there belong to the genus *Choeronycteris*. However, Cockrum (1991) does report LLNB from the Santa Catalina Mountains but only once in a mist net set in Sabino Canyon (a female in June).

The diet of LLNB in Arizona consists primarily of the nectar, pollen, and ripe fruit of columnar cacti (particularly saguaro) and agave (e.g., *Agave chrysantha, A. deserti, A. palmeri,* and *A. parryi*). LLNB have been demonstrated to be a significant pollinator of saguaros, organpipe cacti (*Stenocereus thurberi*), and agaves (Howell and Roth 1981, Alcorn et al. 1962, and McGregor et al. 1962). Generally, LLNB in Arizona forage after dusk to nearly dawn during the months of May through September. In a single night, LLNB will forage well away from their daytime roost sites. In Sonora, Mexico, bats feed on the mainland by night at Bahia Kino and roost by day on Isla Tiburon, 15 to 20 mi (24 to 32 km) away. The closest sizable densities of columnar cacti to LLNB roosts in the Sierra Pinacate, Sonora, Mexico, are found in Organpipe Cactus National Monument in Arizona, about 25 to 30 mi (40 to 48 km) away (Fleming 1991).

In Arizona, females arrive in late March and early April, then migrate northward through Mexico along a "nectar corridor" provided by columnar cacti such as saguaro and organpipe (Fleming 1991). Female LLNB usually arrive in Arizona pregnant and congregate in traditional maternity roosts at lower elevations, feeding primarily on saguaro nectar (Cockrum 1991). Adult males arrive later in the summer and, along with dispersing members of the maternity roosts, usually roost at higher elevations, especially within proximity to significant stands of flowering agave.

LLNB are gregarious and form large maternity colonies that number in the thousands (Hayward and Cockrum 1971, Hoffmeister 1986). All four of the verified LLNB maternity roosts in the United States are found in Arizona (Cockrum 1991). The largest and most important of the four is found in a mine located in Organpipe Cactus National

Monument. About 15,000 LLNB use this mine as a maternity roost. Young are typically born between mid-May and early June (Cockrum 1991, Hayward and Cockrum 1971).

While in the roost during the day, LLNB engage in various activities such as flying, suckling of young, grooming, resting, and interacting with neighbors. LLNB are particularly active during the day and any disturbance, such as aircraft or other human activities, may cause an expenditure of extra energy (Dalton and Dalton 1993, Dalton et al. 1994). Female LLNB gathered in large maternity colonies are particularly vulnerable to disturbances. Maternity colonies are more sensitive because of the vulnerability of nonvolant young, whose recruitment into the population is essential to maintain a viable population.

2.4c Critical Habitat

No critical habitat has been designated for LLNB.

2.4d Current Status Statewide

USFWS listed LLNB as endangered throughout its range in the southwestern United States and Mexico on 30 September 1988 (USFWS 1988). Loss of roost and foraging habitat, as well as direct take of individual bats during animal control programs (particularly in Mexico) have contributed to the current endangered status of the species. All available information on the species through 1994 was summarized in the Lesser Long-nosed Bat Recovery Plan approved in 1997 (Fleming 1994). The Plan indicates that the species is not in danger of extinction in Arizona or Mexico. The species still warrants some protection, as it is vulnerable to human disturbance at roost sites because of its gregarious behavior. There also is particular concern for the protection of forage plants from disturbance or destruction near roost sites.

The primary threats to LLNB populations are agave harvesting and human disturbance of roosting and maternity colonies. Suitable day roosts and suitable concentrations of food plants are the two resources that are crucial to LLNB (Fleming 1995). The USFWS determined that the LLNB was endangered because of the following factors (USFWS 1988):

- A long term decline in population,
- Reports of absence from previously occupied sites
- Decline in the pollination of certain agaves.

Known major roost sites include 16 large roosts in Arizona and Mexico (Fleming 1995). According to surveys conducted in 1992 and 1993, the number of bats estimated to occupy these sites was greater than 200,000. Twelve major maternity roost sites are known from Arizona and Mexico. Disturbance of these roosts, or removal of the food plants associated with them, could lead to the loss of the roosts. Limited numbers of maternity roosts may be the critical factor in the survival of this species.

2.4e Environmental Baseline

LLNB roosts are not known within the proposed corridor, but field surveys did locate small caves and crevices nearby that could serve as LLNB day roosts (HEG 2002, unpublished data). Furthermore, unsurveyed caves, mineshafts, and adits, which may provide suitable roost sites, occur within the Tumacacori-Atascosa mountains. The two closest known LLNB roost sites are the Cave of the Bells in the Santa Rita Mountains, approximately 32 km (20 mi) to the west, and a cave in the Patagonia Mountains, approximately 56 km (35 mi) to the west. Both of these roost sites are within the known flight distance to the proposed action and may utilize the proposed corridor for foraging.

Saguaro cacti occur within the proposed corridor north of Duval Mine Road and agaves are present in varying densities south of Arivaca Road. While the exact densities of agaves and saguaro cacti were not determined for this BA, CNF estimates that Palmer's agave is widely scattered over 1 million acres (400,000 ha) at densities of 10 to 200 per acre, generally between the elevations of 3,000 ft (914 m) and 6,000 ft (1,829 m) (USFWS 2002b).

The northern portion of the proposed action is primarily undeveloped but does contain some existing electrical distribution lines as well as low density housing developments near Sahuarita Road. The Mission Mine Complex also is located within this section of the project area and the proposed action passes through the Tumacacori EMA of the CNF. Range condition in areas crossed by the proposed action is moderately high with a stable or unknown trend. While agaves have persisted in areas grazed for more that 100 years, mortality through direct herbivory and trampling is known to occur. There is a forest-wide study to determine the effects of livestock grazing on agaves currently underway (USFWS 2001b). Livestock stocking rates for the allotments within the Tumacacori EMA range from 1,320 AUMs in the Peña Blanca Allotment to 2400 AUMs in the Bear Valley Allotment. Allotment Management Plans for Bear Valley and Sardinia Allotments are currently being revised.

2.4f Effects of Proposed Action on the LLNB

Direct Effects

Construction Noise and Activity

Although LLNB roosts have not been detected within the proposed corridor, short term noise disturbance and human activity associated with construction activities may disturb LLNB if they are present in undetected roosts adjacent to the proposed corridor. The greatest likelihood of noise disturbance will result from the use of helicopters during the installation, but could also result from the presence of heavy machinery or large groups of construction personnel in close proximity to an undetected roost. The consequences of disturbance to small numbers of LLNB in day roost will be less serious than disturbance of large aggregations of bats at one location.

Indirect Effects

Habitat Modification

Indirect effects to LLNB may result from the potential reduction in forage resources (agaves and saguaro cacti) during construction of temporary access roads or the installation of transmission structures. Because agaves and saguaro cacti are unevenlydistributed and the nectar provided by them are seasonally and geographically separated, the loss of significant numbers of either species may alter LLNB foraging patterns and roost selection within the action area. Even if the loss of a high density patch of flowering agaves does not cause the abandonment of a roost, bat survivorship may be reduced through increased foraging flight distances, related energy expenditures, and increased exposure to predators. Because of the linear nature of the proposed action, however, these impacts will be widely distributed and relatively minor in any single area.

Although all agave and saguaro disturbed as a result of the proposed action will be transplanted immediately outside of the construction zone, the long term survival and future flowering of these specimens is uncertain. Agaves are typically easy to cultivate in warm climates with well drained soils (Gentry 1982), but no long term studies of agave transplant survival have been conducted. Transplantation of saguaro is a common practice within southern Arizona, but preliminary results from a 10 year study indicate that smaller saguaros (<16 ft [5 m] tall) are more successfully transplanted than larger saguaros (HEG, unpublished data).

Even in areas where no agave or saguaro presently exist, dormant seeds may be present in the soil. Construction activities associated with the proposed action may compact soil and alter water infiltration, which may prohibit seed germination.

Increased Legal and Unauthorized Access to LLNB Habitat

Because LLNB are sensitive to human disturbance, (to the point of temporarily abandoning a day roost after a single human intrusion) increased human access to roost sites could negatively impact LLNB. The presence of new roads on state land will not likely result in disturbance to undetected roosts because few sites in this area support the rock outcropings, caves, and mine shafts necessary for LLNB roosts. The greatest potential for undetected roosts occurs on CNF land. The road closures on CNF land outlined in SECTION 1.4 and in the RA (URS 2003) will minimize the probability of increased human access and disturbance of LLNB in undetected roosts in these areas.

Accidental Wildfire

Increased road access may contribute to an increase in the frequency of human caused ignitions in some areas (Gucinski et al. 2001). Agaves in desert grasslands have evolved with fire, but unnaturally high fire frequency and intensity can lead to the decline or elimination of agave populations. Furthermore, agave mortality from fire may affect the abundance and distribution of blooming agaves for a number of years, especially if there is high mortality within certain age and size classes.

New roads also may act as firebreaks and improve the response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak effectiveness in southern California came to similar conclusions (Green 1977). If deemed appropriate, new roads may allow fuelwood collection in areas currently not accessible, thereby reducing the density of downed, woody material, which is capable of supplying wildfires across the landscape.

The measures outlined in the Fire Prevention Plan being developed will minimize the risks of wildfires associated with the proposed action.

Invasive Species
Roads may be the first point of entry for invasive species into a new landscape and may serve as a corridor along which plants move farther into the landscape (Lonsdale and Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move away from the roadside into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires. An increased risk of fire in LLNB habitats could be detrimental to the species because it would eliminate essential features, such as saguaros and desert tree species, which are not fire adapted. Fire stimulates Lehmann's lovegrass, which in turn stimulates more fire, the result is an increase in the fire return interval at the expense of native plant species (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.4g Cumulative Effects
Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. The action area for this species crosses private, state, and federal land. Future federal actions on USFS land will be subject to Section 7 consultation but these actions will not be considered cumulative. Because the action area for this species includes a 40 mi (64 km) buffer, some of the future planned actions on private and state land in southern Pima County and much of Santa Cruz County may be considered cumulative.

Although the amount of this future private development within the action area is unknown, many rural areas of Arizona are experiencing substantial growth. Pima County grew by 26.5 percent between 1990 and 2000 (U.S. Census Bureau 2000). In the same time period, Santa Cruz County grew by 29.3 percent (U.S. Census Bureau 2000).

An undetermined level of border crossings by UDI occurs within the action area resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase. Additionally, agriculture, recreation, OHV use, grazing, and other activities continue to occur on private and state land that adversely affect LLNB and their habitats.

2.4h Incidental Take

The potential disturbance of LLNB in undetected roosts from construction noise and potential mortality of transplanted forage species may affect, and is likely to adversely affect, this species.

No take of LLNB is anticipated as a result of the proposed action for the following reasons. First, noise disturbance will likely impact small numbers of individuals and will be short term in duration, and secondly, changes in agave and saguaro distribution will not be significant in any single location.

2.5 CHIRICAHUA LEOPARD FROG (*Rana Chiricahuensis)* (Threatened)

2.5a Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. The action area for the CLF consists of all cienegas, pools, livestock tanks, and streams at elevations above 3,200 ft (975 m) in the Tumacacori and Atascosa/Pajarito mountains. The action area also includes the entire watersheds of these aquatic systems and lies almost entirely on CNF land. That portion of the action area not on CNF land is a considerable distance downstream of the proposed action.

2.5b Natural History and Distribution

CLF (Figure 16) are distinguished from other members of the leopard frog (*Rana pipiens*) complex by a combination of characters, including a distinctive pattern on the rear of the thigh consisting of small, raised, cream-colored spots or tubercles on a dark background, dorsolateral folds that were interrupted and deflected medially, stocky body proportions, relatively rough skin on the back and sides, and often green coloration on the head and back (Platz and Mecham 1979). The species also has a distinctive call consisting of a relatively long snore of one to two seconds in duration (Davidson 1996, Platz and Mecham 1979).

Figure 16. Chiricahua leopard frog.

CLF are riparian habitat generalists, occupying springs, cienegas, canals, small creeks, mainstem rivers, lakes and livestock tanks at elevations of 3,281 ft (1,000 m) to 8,890 ft (2,710 m). These frogs are found in central and southeastern Arizona; west-central and southwestern New Mexico; and in Mexico, northern Sonora, and the Sierra Madre Occidental of Chihuahua, northern Durango and northern Sinaloa (Platz and Mecham 1984, Degenhardt et al.1996, Sredl et al. 1997). Adult CLF are the most aquatic of all Arizona leopard frogs, requiring aquatic habitats for larval forms and semi-aquatic habitats for adult forms. CLF may breed anytime, but breeding in late spring and early summer is most common. Eggs are oviposited in shallow water attached to vegetation, or on bottom substrate. Tadpoles can metamorphose in as few as three months, but may overwinter and metamorphose the following spring. Because time from hatching to metamorphosis is shorter in warm water than cold water, water permanency is probably more important at higher elevations.

Heterogeneous habitat is important for leopard frog populations; shallow water with emergent vegetation is important for breeding and deeper water provides escape cover for adults. In Arizona, slightly more than half of known historic localities are natural lotic systems, a little less than half are stock tanks, and the remainder are lakes and reservoirs (Sredl et al. 1997). Sixty-three percent of extant populations in Arizona occupy stock tanks (Sredl and Saylor 1998). Although stock tanks provide refugia for frog populations and are important for this species in many areas, such tanks support only small populations and these habitats are very dynamic. Tanks often dry out during drought, and flooding may destroy downstream impoundments or cause siltation, either of which may result in loss of aquatic communities and extirpation of frog populations. Periodic maintenance to remove silt from tanks also may cause a temporary loss of habitat and mortality of frogs.

CLF are rarely found in aquatic sites inhabited by non-native fish, bullfrogs (*Rana catesbiana*), and/or crayfish (*Oronectes virilis*). However, in complex systems or large aquatic sites, CLF may coexist with low densities of non-native predators (Bloomquist et al. 2002).

Where the species is extant, sometimes several small populations are found in close proximity, suggesting metapopulations are important for preventing regional extirpation (Sredl et al. 1997). Disruption of metapopulation dynamics is likely an important factor in regional loss of populations (Sredl et al. 1997, Sredl and Howland 1994). CLF populations are often small and their habitats are dynamic, resulting in a relatively low probability of long-term population persistence. However, if populations are relatively close together and numerous, extirpated sites can be recolonized.

The range of the species is divided into two parts, including: (1) a southern group of populations (the majority of the range) located in mountains and valleys south of the Gila River in southeastern Arizona, extreme southwestern New Mexico, and Mexico; and (2) northern montane populations in west central New Mexico and along the Mogollon Rim in central and eastern Arizona (Platz and Mecham 1979). Historical records exist for Pima, Santa Cruz, Cochise, Graham, Apache, Greenlee, Gila, Coconino, Navajo, and Yavapai counties in Arizona, and Catron, Grant, Hidalgo, Luna, Soccoro, and Sierra counties in New Mexico (Sredl et al. 1997, Degenhardt et al. 1996). The distribution of the CLF in Mexico is unclear. The species has been reported from northern Sonora, Chihuahua, and Durango (Hillis et al. 1983, Platz and Mecham 1979, 1984) and, more recently, from Aguascalientes. However, Webb and Baker (1984) concluded that frogs from southern Chihuahua were not CLF. The taxonomic status of *chiricahuensis*-like frogs in Mexico from southern Chihuahua to Aguascalientes is unclear and in this region another leopard frog, *Rana montezumae,* may be mistaken for the CLF.

Recent evidence suggests a chytridiomycete skin fungi is responsible for observed declines of frogs, toads, and salamanders in portions of Central America (Panama and Costa Rica), South America (Atlantic coast of Brazil, Ecuador, and Uruguay), Australia (eastern and western states), New Zealand (South Island), Europe (Spain and Germany), Africa (South Africa, “western Africa”, and Kenya), Mexico (Sonora), and the United States (8 states) (Speare and Berger 2000, Longcore et al. 1999, Berger et al. 1998). Ninety-four species of amphibians have been diagnosed as infected with the chytrid *Batrachochytrium dendrobatidis*. In Arizona, chytrid infections have been reported from four populations of CLF, as well as populations of Rio Grande leopard frog (*Rana berlandieri*), Plains leopard frog (*Rana blairi*), lowland leopard frog (*Rana yavapaiensis*), Tarahumara frog (*Rana tarahumarae*), canyon treefrog (*Hyla arenicolor*), and Sonora tiger salamander (*Ambystoma tigrinum stebbinsi*) (Davidson et al. 2000, Sredl and Caldwell 2000, Morell 1999). The disease was recently reported from a metapopulation of CLF from New Mexico; that metapopulation may have been extirpated.

The role of the fungi in the population dynamics of CLF is undefined; however, it may well prove to be an important contributing factor in observed population decline. Rapid death of recently metamorphosed frogs in stock tank populations of CLF in New Mexico was attributed to post-metamorphic death syndrome (Declining Amphibian Populations Task Force 1993). Hale and May (1983) and Hale and Jarchow (1988) believed toxic airborne emissions from copper smelters killed Tarahumara frogs and CLF in Arizona and Sonora. However, in both cases, symptoms of moribund frogs matched those of chytridiomycosis. Chytrids were recently found in a specimen of Tarahumara frog collected during a die off in 1974 in Arizona. This earliest record for chytridiomycosis corresponds to the first observed mass die-offs of ranid frogs in Arizona (USFWS 2002c).

2.5c Critical Habitat
No critical habitat has been designated for this species.

2.5d Current Status Statewide
USFWS listed this species as threatened throughout its range in the southwestern United States and in Mexico on 13 June 2002 (USFWS 2002c). Potential threats to the species include disease, predation and possibly competition by non-native organisms, including fishes in the family Centrarchidae (*Micropterus* spp., *Lepomis* spp.), bullfrogs, tiger salamanders (*Ambystoma tigrinum stebbinsi*), crayfish, and several other species of fishes, including, in particular, catfishes (*Ictalurus* spp. and *Pylodictus oliveris*) and trout (*Oncorhynchus* spp. (=*Salmo*) and *Salvelinus* spp.) (USFWS 2002c). For instance, in the Chiricahua region of southeastern Arizona, Rosen et al. (1996a) found that almost all perennial waters investigated that lacked introduced predatory vertebrates supported CLF. All waters, except three that supported introduced vertebrate predators, lacked CLF.

Human factors affecting the species include modification or destruction of habitat through water dams, water diversions, groundwater pumping, introduction of non-native organisms, woodcutting, mining, contaminants, urban and agricultural development, road construction, overgrazing and altered fire regimes. Additional human factors include over-collection for commercial and scientific purposes.

In Arizona, the species is extant in seven of eight major drainages of historical occurrence (Salt, Verde, Gila, San Pedro, Santa Cruz, Yaqui/Bavispe, and Magdalena river drainages), but appears to be extirpated from the Little Colorado River drainage on the northern edge of the range. Within the extant drainages, the species was not found recently in some major tributaries and/or from river mainstems. For instance, the species was not reported from 1995 to the present from the following drainages or river mainstems where it historically occurred: White River, West Clear Creek, Tonto Creek, Verde River mainstem, San Francisco River, San Carlos River, upper San Pedro River mainstem, Santa Cruz River mainstem, Aravaipa Creek, Babocomari River mainstem, and Sonoita Creek.

USFWS reports that CLF were observed at 87 sites in Arizona from 1994 to 2001, including 21 northern sites and 66 southern sites (USFWS 2002c). Many of these sites have not been revisited in recent years; however, evidence suggests some populations have been extirpated in the Galiuro and Chiricahua mountains. In 2000, the species was also documented for the first time in the Baboquivari Mountains, Pima County, Arizona (USFWS 2002c).

Intensive and extensive surveys were conducted by AGFD in Arizona from 1990 to 1997 (Sredl et al. 1997). Included were 656 surveys for ranid frogs within the range of the CLF in southeastern Arizona. Rosen et al. (1994, 1996a, 1996b), Hale (1992), Wood (1991), Clarkson and Rorabaugh (1989), and others have also extensively surveyed wetlands in southeastern Arizona. It is unlikely that many additional populations will be found there. A greater potential exists for locating frogs at additional sites in the northern region of Arizona, as several new populations have been discovered on the Coconino National Forest in 2000 and 2001 (USFWS 2002c).

The latest information for Arizona (USFWS 2002c) indicates the species is extant in all major drainages in Arizona and New Mexico where it occurred historically. However, it has not been found recently in many rivers, valleys, and mountains ranges, including the following in Arizona: White River, East Clear Creek, West Clear Creek, Silver Creek, Tonto Creek, Verde River mainstem, San Francisco River, San Carlos River, upper San Pedro River mainstem, Santa Cruz River mainstem, Aravaipa Creek, Babocomari River mainstem, Sonoita Creek, Pinaleno Mountains, Peloncillo Mountains, Sulphur Springs Valley, and Huachuca Mountains. In many of these regions CLF were not found for a decade or more despite repeated surveys.

2.5e Environmental Baseline

The action area for this species lies within the Tumacacori EMA of the CNF. Within this EMA, CLF are present in Sycamore Canyon, Peña Blanca Spring, Hank & Yank Tank, and Bear Valley Tank (J. Rorabaugh, USFWS, pers. comm., 1 Oct. 2002). The population in Sycamore Canyon is probably a source of immigrants to other suitable areas within the EMA (USFWS 2001b). Sycamore Canyon also is the only aquatic habitat within the EMA confirmed to contain the chytrid fungus (J. Rorabaugh, USFWS, pers. comm., 1 Oct. 2002). While there are 17 historical records of CLF in the Pajarito/Atascosa Mountains (USFWS 2001b), there are currently no plans for reintroducing CLF into any aquatic habitats in CNF (J. Rorabaugh, USFWS, pers. comm., 1 Oct. 2002). .

Watershed condition is a function of percent ground cover present to dissipate rain and prevent excess erosion. The Crossover Corridor approaches within 1,312 ft (400 m) of Red Spring and within 2 mi (3.2 km) of a total of 4 mapped springs (URS 2002). In addition to stock tanks scattered throughout the Tumacacori EMA, a number of perennial pools occur within Peck Canyon, however, the function (i.e. percent ground cover present to dissipate rain and prevent excess erosion) of the Peck Canyon watershed is unsatisfactory.

Protocol surveys were not conducted for CLF along the proposed ROW in 2002 because of fire closures and permit issues. Protocol surveys for CLF will be conducted in Peck Canyon in the year prior to construction. If CLF are documented, consultation with USFWS will be reinitiated.

2.5f Effects of Proposed Action on the CLF

Direct Effects

There are no recent records of CLF within the vicinity of the Crossover Corridor and no reintroductions are planned, therefore, no direct effects to CLF are anticipated.

Indirect Effects

Habitat Modification

Some modifications to perennial pools within Peck Canyon may occur as a result of increased erosion and while no reintroductions of CLF into this area are planned, vehicle traffic in the stream bottom may change the stream morphology precluding natural recolonization by the species. BMPs will minimize erosion into aquatic systems along this proposed ROW.

Transport of Disease Agents

Sycamore Canyon, 2.5 mi (4.2 km) from the proposed action, is the only aquatic habitat within the EMA confirmed to contain the chytrid fungus, therefore, increase in the risk of disease transport is unlikely.

Increased Legal and Unauthorized Access to CLF Habitat

Recreationists may access potential CLF habitat by use of roads constructed for the proposed action, even after the roads have been closed and revegetated. Unmanaged OHVs may damage riparian vegetation, increase siltation in pools, compact soils, and disturb water in stream channels. Increased human access to these aquatic habitats also may lead to the introduction of non-native predators to streams and stock tanks. The absence of CLF reintroduction plans, the long-term monitoring, and maintenance of road closures will minimize the probability of unauthorized access and thereby minimize any adverse effects associated with such access.

Accidental Wildfire

There is a minimal risk from accidental wildfire associated with the proposed action. Any fire would have to spread a significant distance before impacting occupied CLF habitat. Numerous roads that could serve as firebreaks and afford firefighting accessibility occur between the proposed action and CLF habitat. Furthermore, the measures outlined in the Fire Prevention Plan will minimize the risks of wildfires associated with the proposed action.

Invasive Species

Roads may be the first point of entry for invasive species into a new landscape and may serve as a corridor along which plants move farther into the landscape (Lonsdale and Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move away from the roadside into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires. Fire stimulates Lehmann's lovegrass, which in turn stimulates more fire, the result is an increase in the fire return interval at the expense of native plant species (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.5g Cumulative Effects

Cumulative effects include the effects of future state, local or private actions that are reasonably certain to occur in the action area considered in this BA. The action area for this species crosses private, state, and federal land. Future federal actions on USFS land would be subject to Section 7 consultation but these actions would not be considered cumulative. Because the action area for this species includes the entire watersheds of the aquatic habitats on the CNF, some of the future planned actions on private and state land in Santa Cruz County may be considered cumulative.

Although the amount of future private development within Santa Cruz County is unknown, many rural areas of Arizona are experiencing substantial growth. Between 1990 and 2000, Santa Cruz County grew by 29.3 percent (U.S. Census Bureau 2000). Despite being downstream of occupied and potential CLF habitat, an increase in regional population translates into an increased demand for outdoor recreation, and therefore more recreational use of USFS land.

An undetermined level of border crossings by UDI also occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and competition at water sources. These border crossings are likely to continue or increase into the foreseeable future.

2.5h Effects Determination and Incidental Take

The transport of sediment into potential habitat and changes in stream morphology may affect CLF, but are not likely to adversely affect the species because any impacts would be attenuated over the time it would take the species to naturally recolonize the area.

Because the proposed action is not likely to adversely affect the species, no take of CLF is anticipated.

2.6 PIMA PINEAPPLE CACTUS *(Coryphantha scheeri* var. *robustispina)* (Endangered)

2.6a Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. Potential habitat for the PPC includes those areas of the proposed ROW from the TEP South Substation to an elevation of 4,600 ft (1,402 m) in the foothills of the Tumacacori Mountains.

2.6b Natural History and Distribution

PPC (Figure 17) are small, round cacti with finger-like projections. Adult cacti range in size from 1.8 in (4.6 cm) to 18 in (46 cm) in height. At the tip of each projection or tubercle is a rosette of 10 to 15 straw-colored spines with one central hooked spine. Plants can be single or multi-stemmed and produce bright yellow flowers after summer rains (Roller 1996).

Figure 17. Pima pineapple cactus.

Populations of PPC are known to occur south of Tucson, in Pima and Santa Cruz counties, Arizona and in adjacent northern Sonora, Mexico. It is distributed at low densities within the Altar and Santa Cruz Valleys, as well as in low lying areas connecting these valleys.

PPC populations are generally found in open patches within semidesert grassland and Sonoran desertscrub plant communities (Brown 1994). They are typically found on flat alluvial bajadas that are comprised of granitic material and are most abundant within the ecotone between the grassland and desertscrub biomes (Roller 1996). This plant is found at elevations between 2,362 (720 m) and 4,593 ft (1,400 m). Typically, PPC are not found in washes or riparian areas.

2.6c Critical Habitat

No critical habitat has been designated for this species.

2.6d Current Status Statewide

USFWS listed PPC as endangered throughout its range on 25 October 1993 (58 FR 49875). Habitat loss and degradation, habitat modification and fragmentation, limited geographic distribution, the rarity fo this plant species, illegal collection, and difficulties in protecting areas large enough to maintain functioning populations, all are factors that contribute to the current endangered status of this species. Due to the limited information on PPC population distributions under current habitat conditions, it is difficult to determine the current status of the plant statewide. USFWS has insufficient data to determine if the majority of populations of PPC can be sustained under current reduced and fragmented conditions. PPC densities vary throughout its range with the highest densities occurring south of Tucson through the Santa Cruz Valley (to Amado and surrounding developed parts of Green Valley and Sahuarita, and parts of the San Xavier District of the Tohono O'odham Nation). Continued urbanization, farm and crop development, mine expansion, and invasion of non-native species are primary threats to PPC populations. Overgrazing by livestock, illegal plant collection, and fire-related interactions involving non-native Lehmann's lovegrass also may have negative impacts on PPC (USFWS 1993).

2.6e Environmental Baseline

The environmental baseline for the PPC evaluates the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat and ecosystem within the action area. Based on monitoring results, the status of the PPC appears to have been recently affected by threats that completely alter or considerably modify more than one-third of the species surveyed habitat and have caused the elimination of nearly 60 percent of documented locations (USFWS 2001c). Dispersed, patchy clusters of individuals are becoming increasingly isolated as urban development, mining, and other commercial activities continue to negatively impact PPC habitat.

The Crossover Corridor is primarily undeveloped but contains some existing electrical distribution lines and associated roads and is in close proximity to low density housing developments, and the Mission Mine Complex. A majority of the corridor also parallels the previously disturbed EPNG gas line. While portions of the existing EPNG gas line access road appear relatively unused and support early successional plants, other areas are severely eroded and virtually impassable by motor vehicles.

Surveys for PPC were conducted using an approved survey protocol (Roller 1996) by establishing a belt transect across identified potential habitat with each surveyor covering a 16.4 to 23 ft (5 to 7 m) swath. One survey pass of the entire corridor was conducted with more intensive area searches around confirmed PPC locations. Surveys on state, private, and BLM land covered a 200 ft (61 m) wide area centered on the proposed structure alignment. On the CNF, the coverage was expanded to 750 ft (229 m) wide. All detected PPC locations were recorded using a Global Positioning System (GPS) unit.

2.6f Effects of Proposed Action on the PPC

<u>Direct Effects</u>
Because the precise locations of structures and access roads can be modified to avoid sensitive resources, the proposed action will not result in the loss of any individual PPC. All known individual PPC near construction areas and along main access routes will be clearly marked and protected to avoid impacts.

<u>Indirect Effects</u>
Modification of Habitat
The construction of new access roads and the installation of structures will alter PPC seed sources in unoccupied, but potential PPC habitat. Construction vehicles will compact

soil, changing water infiltration rates, and road construction will dramatically alter soil structure and seed source depth. Areas around structure sites and many access roads will be temporary and will regenerate as potential PPC habitat in the future. Recent observations indicate that PPC may readily establish in recently disturbed habitats (USFWS 2002c), but these areas must be allowed to recover for years or possibly decades.

To determine the extent of proposed disturbance to PPC habitat, recent aerial photography was used to eliminate areas not suitable for PPC, including slopes over 15 percent, washes, and previously disturbed areas such as roads, buildings, mining disturbance, etc. Based on this analysis, the ROW was divided into habitat classes based upon density of PPC in each area. The habitat classes are as follows: Class A = >0.3 PPC/acre; Class B = 0.1 – 0.3 PPC/acre; Class C = 0* - 0.09 PPC/acre.

To mitigate for the potential loss of PPC habitat, TEP will purchase credits in a USFWS-approved conservation bank for PPC.

<u>Indirect Effects</u>

Increased Legal and Unauthorized Access to PPC Habitat

Much of the proposed corridor through PPC habitat parallels existing electrical distribution lines with existing utility access roads. Some new access roads, however, will be constructed, potentially resulting in unintended access into previously undisturbed PPC habitat (especially by OHV users). Off-road travel could directly impact additional PPC or impede seedling establishment through changes in soil characteristics. Where possible, TEP will review the potential for closure of roads on private land to limit unauthorized access to the ROW.

Accidental Wildfire

Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). It is widely regarded that most succulent species are negatively impacted by fire and are not fire adapted (Rogers and Steele 1980, McLaughlin and Bowers 1982). Plants die by direct heating of the fire or later through indirect fire effects such as grazing of spineless plants, post-fire increase in plant tissue temperature, or the introduction of disease or infestation into weakened plants (Thomas 1991). The sparse distribution of this species across the landscape can mean that loss of just a few individuals to fire can greatly affect the range and density of local PPC populations.

New roads may act as natural firebreaks and improve response times of firefighters to wildfires, thereby preventing fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak efficacy in southern California came to similar conclusions (Green 1977).

The measures outlined in the Fire Prevention Plan will minimize the risks of wildfires associated with the proposed action.

Invasive Species

Roads may be the first point of entry for invasive species into a new landscape and may serve as a corridor along which plants move farther into the landscape (Lonsdale and Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move away from the roadside into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires. An increased risk of fire in CFPO habitats could be detrimental to the species because it would eliminate essential features, such as saguaros and desert tree species, which are not fire adapted. Fire stimulates Lehmann's lovegrass, which in turn stimulates more fire, the result is an increase in the fire return interval at the expense of native plant species (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.6g Cumulative Effects

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this biological assessment. Under Section 9 of the Act, the taking of listed animals is specifically prohibited, regardless of land ownership status. For listed plants, these prohibitions and the protection they afford do not apply. Listed plant species are protected only from deliberate removal from Federal land. There is no protection against removal or destruction of plants by a landowner on private land under the ESA.

Although the amount of future private development within the action area is unknown, many rural areas of Arizona are experiencing substantial growth. Pima County grew by 26.5 percent between 1990 and 2000 (U.S. Census Bureau 2000). Because of these growth rates and the development pressures of nearby Tucson and Sahuarita, Arizona, it is foreseeable that some lands adjacent to the proposed ROW will be developed. These developments will likely include increases in associated infrastructure such as roads, groundwater use, and commercial services, all resulting in the degradation of PPC habitat.

An undetermined level of border crossings by UDI occurs within the action area and results in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase into the foreseeable future. Additionally, PPC habitat is adversely affected by continual agriculture, recreation, OHV use, grazing, and other activities on private and state land.

2.6h Effects Determination

Construction activities and increased access may affect, and are likely to adversely affect PPC within the ROW, potential PPC habitat, and seedling establishment. The adverse affects to the species will be mitigated through the purchase of mitigation bank credits.

2.7 JAGUAR *(PANTHERA ONCA)* (ENDANGERED)

2.7a Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. Because of the large movements possible by the jaguar and historical records for the species in a variety of habitats, the action area for the jaguar considered for the proposed action includes most of western Santa Cruz and southern Pima counties.

2.7b Natural History and Distribution

Jaguars (Figure 18) are the largest species of cat now native to the Western Hemisphere. Jaguars are large muscular cats with relatively short massive limbs, a deep-chested body, and cinnamon-buff in color with many black spots. Its range in North America includes Mexico and portions of the southwestern United States (Hall 1981). A number of jaguar records are known for Arizona, New Mexico, and Texas. Additional reports exist for California and Louisiana. Records of the jaguar in Arizona and New Mexico have been attributed to the subspecies *Panthera onca arizonensis*. The type specimen of this subspecies was collected in Navajo County, Arizona, in 1924 (Goldman 1932). Nelson and Goldman (1933) described the distribution of this subspecies as the mountainous parts of eastern Arizona north to the Grand Canyon, the southern half of western New Mexico, northeastern Sonora, and, formerly, southeastern California. The records for Texas have been attributed to another subspecies *P. o. veraecrucis*. Distribution of this subspecies was described by Nelson and Goldman (1933) as the Gulf slope of eastern and southeastern Mexico from the coast region of Tabasco, north through Vera Cruz and Tamaulipas, to central Texas. Swank and Teer (1989) indicated the historical range of the jaguar included portions of Arizona, New Mexico, and Texas. These authors consider the current range to be central Mexico through Central America and into South America as far as northern Argentina.

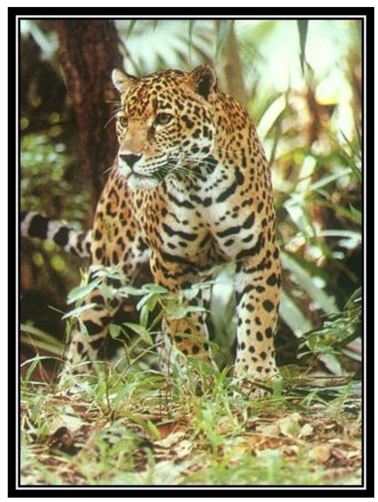


Figure 18. Jaguar.

Swank and Teer (1989) stated the United States no longer contains established breeding populations of jaguar, which probably disappeared from the United States in the 1960s. According to these authors, the jaguar prefers a warm tropical climate and is usually associated with water, and rarely found in extensive arid areas. Goldman (1932) believed the jaguar was a regular, but not abundant, resident in southeastern Arizona. Hoffmeister (1986) considered the jaguar an uncommon resident species in Arizona. He concluded that the reports of jaguars between 1885 and 1965 indicated a small but resident population once occurred in southeastern Arizona. Brown (1983a) suggested the jaguar in Arizona ranged widely throughout a variety of habitats from Sonoran desert scrub through subalpine conifer forest. Most of the records were from Madrean evergreen-woodland, shrub-invaded semidesert grassland, and along rivers.

Brown (1983a) presented an analysis suggesting there was a resident breeding population of jaguars in the southwestern United States at least into the 20th century. USFWS (1990) recognized that the jaguar continues to occur in the American southwest as an occasional wanderer from Mexico. Currently, breeding population of jaguar are unknown in the United States.

In Arizona, the gradual decline of the jaguar appeared to be concurrent with predator control associated with land settlement and the development of the cattle industry (Brown 1983a, USFWS 1990). Lange (1960) summarized the jaguar records from Arizona, and between 1885 and 1959 the reports consisted of 45 jaguars killed, six sighted, and two recorded by sign. Brown (1991) related that the accumulation of all known records indicated a minimum of 64 jaguars were killed in Arizona after 1900.

2.7c Critical Habitat
No critical habitat has been designated for this species.

2.7d Current Status Statewide
Jaguar were initially listed as endangered from the United States - Mexico border southward to include Mexico and Central and South America (37 FR 6476, 1972; 50 CFR 17.11, August 1994). As a result of a petition, the jaguar was proposed as endangered in the United States (59 FR 35674; July 13, 1994). In a Federal Register notice dated 22 July 1997, the jaguar was listed as an endangered species in the United States (62 FR 39147).

The most recent records of jaguars in the United States are from Arizona. In 1971, a jaguar was taken east of Nogales and in 1986 one was taken from the Dos Cabezas Mountains. The latter reportedly had been in the area for about a year before it was killed. AGFD (1988) cited two recent reports of jaguars in Arizona. The individuals were considered to be transients from Mexico. One report (1987) was from an undisclosed location. The other report was from 1988, when tracks were observed for several days prior to the treeing of a jaguar by hounds in the Altar Valley, Pima County. An unconfirmed report of a jaguar at the Coronado National Memorial was made in 1991. In 1993, an unconfirmed sighting of a jaguar was reported for Buenos Aires National Wildlife Refuge. In March 1996, the presence of a jaguar was confirmed through photographs made in the Peloncillo Mountains of Arizona and New Mexico (Glenn 1996). AGFD reported a jaguar sighting in the Baboquívari Mountains in 1996, and in the fall of 1997, one was reported from the Cerro Colorado Mountains of southern Arizona. A jaguar was recently documented (December 2001) in the Atascosa Mountains within about 2 mi (3 km) of the proposed action.

2.7e Environmental Baseline
The Tumacacori EMA is the location of recent reports of jaguars in the United States. This area continues to include the most likely habitat that will support the existence of jaguars in the United States. Many of the larger canyon bottoms in the Tumacacori EMA contain substantial cover and could act as travel corridors for dispersing jaguars. It is believed that all recent sightings of jaguars in Arizona are males dispersing north from

the northern most breeding population in Mexico in an effort to find unoccupied habitat (B. VanPelt, AGFD, pers. comm., 3 October 2002). Because no breeding pairs are thought to exist north of the United Sates-Mexico border, conservation of the Mexican population is vital to the future presence of jaguars in Arizona.

Under the leadership of AGFD and New Mexico Department of Game and Fish, a conservation agreement and strategy has been prepared to address the conservation of the jaguar in Arizona and New Mexico. This agreement established an interstate/intergovernmental Jaguar Conservation Team under a Memorandum of Agreement (MOA). This MOA has been signed by various state and federal cooperators and local and tribal governments with land and wildlife management responsibilities in the geographic area of concern. The Jaguar Conservation Agreement and Strategy serves as a mechanism for implementation of actions for the protection and conservation of the jaguar, while providing a template for the recovery of the species until a recovery plan is prepared and adopted.

The Conservation Agreement established procedures for reporting and evaluating jaguar sightings and compiling distribution and occurrence information, investigation of livestock depredation, evaluation of habitat suitability, development of education materials, and other activities. The Jaguar Conservation Agreement also provides for participation by interested private citizens and organizations. CNF grazing allotment permitees are participating in this process.

The December 2001 sighting mentioned earlier came from a remote camera operated under the direction of the Jaguar Conservation Team (S. Schwartz, AGFD, pers. comm., 17 September 2002). Currently, 14 remote cameras are positioned along the United States-Mexico border in an attempt to document movement of jaguars in and out of Arizona (J. Childs, Jaguar Conservation Team, pers. comm., 3 October 2002).

2.7f Effects of Proposed Action on the Jaguar

Direct Effects

Construction Noise and Activity

Because jaguars are primarily nocturnal, disturbance from construction activities, even in suitable dispersal habitat, is unlikely. The greatest likelihood of noise disturbance will result from the use of helicopters during early morning or late evening hours. However, because of the linear nature of the proposed action, any noise disturbance will be widely distributed and relatively short term in any location. Any jaguar within the action area will likely avoid construction sites. The use of additional remote cameras to monitor the United States-Mexico border south of the proposed action also will minimize the possibility of construction activities affecting breeding jaguars.

Indirect Effects

Habitat Modification and Fragmentation

Roads can reduce habitat value because of habitat fragmentation and edge effects. Some studies have shown that a few large areas of low road density, even in a landscape of high average road density, may be the best indicator of suitable habitat for large vertebrates (Rudis 1995). Because construction activities within riparian corridors or other major canyons will be minimal and widely distributed, no adverse impacts to the composition or structure of jaguar movement corridors or fragmentation of habitat is anticipated. Furthermore, access and construction roads for the proposed action commonly are spurs off existing roads and range between 500 ft (152 m) and 1,000 ft (305 m) in length, which do not isolate or separate habitat patches.

While access roads and structure site construction could degrade the habitats of jaguar prey species, effects on the prey base are difficult to quantify. The primary jaguar prey species in Arizona is deer (*Odocoileus* spp.), which have relatively large home ranges. Road-avoidance behavior (up to distances of 300 ft [90 m] to 600 ft [180 m]) is common in large mammals (Lyon 1983), including those species that may serve as prey for jaguars. Because of the linear nature of the proposed action, impacts to deer habitat will be widely distributed and relatively minor in any single area.

Increased Legal and Unauthorized Access to Jaguar Habitat

Jaguars appear to be relatively tolerant of some level of human activity (B. VanPelt, AGFD, pers. comm., 3 October 2002) and have been documented using areas that have recreational and agricultural activities occurring on a regular basis. However, increased human access to potential jaguar habitat through the use of temporary proposed construction roads could reduce the quality of the habitat. The road closure techniques outlined in the SECTION 1.4 and the RA (URS 2003) will minimize unintended uses of these roads.

Accidental Wildfire

Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). Because of their mobility, jaguars will not likely be directly impacted by wildfires; however, these wildfires could potentially alter or destroy portions of prey species habitat. While the short-term effects of wildfires may affect prey species through loss of forage from the fire, increased herbaceous production in the years following a fire may improve habitat in the long term.

New roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak effectiveness in southern California came to similar conclusions (Green 1977). If deemed appropriate, new roads may allow fuelwood collection in areas currently not accessible, thereby reducing the density of downed, woody material, which is capable of carrying wildfires across the landscape. The fire prevention measures being developed for the Fire Prevention Plan will minimize the risks of wildfires associated with the proposed action.

Invasive Species

Roads may be the first point of entry for invasive species into a new landscape, and can serve as a corridor along which plants move farther into the landscape (Lonsdale and Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann's lovegrass, an invasive species that facilitates wildfires (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.6g Cumulative Effects

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. While the action area for this species encompasses private, state, and federal lands, the habitat with the highest potential for occupancy by jaguars occurs on USFS land in Santa Cruz County. Future federal actions on these lands will be subject to Section 7 consultation; these actions will not be considered cumulative.

Although the amount of future private development within Santa Cruz County is unknown, many rural areas of Arizona are experiencing substantial growth. Between 1990 and 2000, Santa Cruz County grew by 29.3 percent (U.S. Census Bureau 2000). Despite its distance from the proposed action, an increase in population in Nogales, Arizona and other regional population centers translates into an increased demand recreational use of USFS land.

An undetermined level of border crossings by UDI also occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase.

2.6h Effects Determination and Incidental Take

Construction noise and activity associated with the proposed action may affect the jaguar, but it is not likely to adversely affect the species because any disturbance will be widely distributed and short term in duration.

Because the proposed action is not likely to adversely affect the jaguar, no take is anticipated.

2.8 GILA TOPMINNOW *(Poeciliopsis occidentalis occidentalis)* (Endangered)

2.8a Action Area

The action area includes all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. In streams, the action area is often much larger than the area of the proposed action because impacts in the watershed may be concentrated in the stream and actions within the stream may be carried downstream well outside of the immediate project area. The action area for the Gila topminnow is the entire Santa Cruz River watershed.

2.8b Natural History and Distribution

The Gila topminnow (Figure 19) was originally described by Baird and Girard (1853) as *Heterandria occidentalis* from a specimen collected in 1851 from the Santa Cruz River near Tucson. It was redescribed by Hubbs and Miller (1941) as *Poeciliopsis occidentalis*. As with all species in the family Poeciliidae, the Gila topminnow exhibits sexual dimorphism. Both males and females are tan to olive-bodied and usually white on the belly. Scales of the dorsum are darkly outlined and the fin rays contain melanophores, although lacking in dark spots. Dominant sexually mature males are often blackened, with some gold on the pre-dorsal midline, orange at the base of the gonopodium, and exhibits bright yellow pelvic, pectoral, and caudal fins (Minckley 1973). Females remain drab in coloration upon reaching maturity and throughout their life. All male poeciliids have a modified anal fin (gonopodium) used to fertilize the female internally.

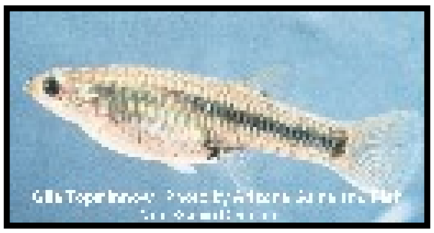


Figure 19. Gila topminnow

Habitat requirements of *P. o. occidentalis* are broad. The species prefers shallow, warm, fairly quiet water; however, they can become acclimated to a much wider range of conditions. Both lentic habitats and lotic habitats with moderate current are easily tolerated. Temperatures from near freezing under ice to 98.6 degrees F (37 degrees C) have been reported, with a maximum tolerance of 109.4 degrees F (43 degrees C) for brief periods (Heath 1962). Gila topminnows can live in a wide range of water chemistries, with recorded pH values from 6.6 to 8.9, dissolved oxygen readings from 2.2 to 11 milligrams/liter (Meffe et al. 1983), and salinities from very dilute to sea water (Schoenherr 1974). The widespread historic distribution of Gila topminnows throughout rivers, streams, marshes, and springs of the Gila River Basin is evidence for their tolerance of these environmental extremes. One reestablished population (Mud Springs) survived for 16 years in a simple cement-watering trough before being moved.

Meffe et al. (1983) reported that topminnows can tolerate almost total loss of water by burrowing into the mud for 1-2 days. Preferred habitats contain dense mats of algae and debris, usually along stream margins or below riffles, with sandy substrates sometimes covered with organic mud and debris (Minckley 1973). Topminnows are usually found in the upper third of the water column and young show a preference for the warmest and shallowest areas (Forrest 1992). Simms and Simms (1992) found topminnows occupying pools, glides, and backwaters more frequently than marshes or areas of fast flow.

According to Schoenherr (1974), the spring-heads presently occupied by Gila topminnows are questionable as preferred habitat. Destruction of historically occupied habitats such as the marshes, sloughs, backwaters, and edgewaters of larger rivers and presence of non-native fish in such habitats that remain has undoubtedly forced Gila topminnow out of their preferred historic habitats and into the spring-heads and smaller erosive creeks we see them in today. Their tolerance of conditions in these habitats has allowed them to maintain populations with less impact from non-native fishes.

Gila topminnows are viviparous fish, meaning embryos grow and mature within the female and are born living. Eggs are fertilized internally through deposition of spermatophores (packets of sperm) into the female genital pore by the male gonopodium. Female Gila topminnow can store spermatozoa for several months, and may produce up to 10 broods after being isolated from males (Schultz 1961). Female Gila topminnows also exhibit superfetation in which 2 or more groups of embryos at different stages develop simultaneously. Females of the genus *Poeciliopsis* generally carry only 2 stages, although some *P. o. occidentalis* females have been shown to carry 3 stages for a few days when population densities are low. The mean interval between broods is 21.5 days (Schoenherr 1974). Brood size ranges from 1-31 dependent upon female standard length (SL) (Constantz 1974; Schoenherr 1974, 1977). Under optimum laboratory conditions, *Poeciliopsis* can produce 10 broods per year at intervals of 7 to 14 days (Schultz 1961). Sexual maturity can be attained as early as 2 months or as late as 11 months following birth, dependent upon the season of birth (Schultz 1961; Constantz 1976, 1979; Schoenherr 1974).

Breeding occurs primarily during January through August, but in thermally constant springs, young may be produced throughout the year (Heath 1962; Minckley 1973; Schoenherr 1974). During the peak of the breeding season up to 98 percent of mature females are pregnant (Minckley 1973). Dominant males turn black, defend territories, and court females. Smaller subordinate males do not turn black or defend territories. Instead, they take on a "sneaking" mating strategy where they attempt to mate with uncooperative females while the dominant male is busy elsewhere. Subordinate males have a longer gonopodium, which may have an adaptive benefit for this type of mating strategy (Constantz 1989). However, if the larger territorial males are removed, smaller males will become dominant, take on breeding coloration, and defend territories (Constantz 1975; Schoenherr 1977). Brood size and the onset of breeding in topminnows can be influenced by several factors including food abundance, photoperiod, temperature, predation upon the population, and female size. Increased food supply and larger female size are believed to contribute to the greater fecundity seen in topminnows from Monkey Spring canal compared with topminnows from Monkey Spring headspring (Constantz 1974, 1979; Schoenherr 1974, 1977). Sex ratios in stabilized populations nearly always favor females, varying from 1.5 to 6.3 per male (Schoenherr 1974).

Gila topminnows are opportunistic omnivorous feeders, having a gut length 1.5 to 2 times SL of the individual (Schoenherr 1974). They have weakly spatulate dentition characteristic of an omnivorous diet. Primary food items include detritus, vegetation, amphipods, ostracods, insect larvae, and rarely, other fish (Schoenherr 1974; Gerking and Plantz 1980; Meffe et al. 1983; Meffe 1984).

Gerking and Plantz (1980) noted that Gila topminnows prefer to eat large prey, but prey sizes are limited by mouth size. Schoenherr (1974) observed that individual fishes in complex habitats with several food resources present will select and focus on different items. He suggested that variation in feeding among individuals prevents over-utilization of a single resource, thus enhancing survival potential of the species.

In the United States, this species currently occurs in the Gila River drainage, Arizona, particularly in the upper Santa Cruz River, Sonoita and Cienega creeks, and the middle Gila River. The Gila topminnow is restricted to 14 natural localities in Arizona. In Mexico, the species occurs in the Río Sonora, Río de la Concepción, and Santa Cruz River but are not listed under the ESA. Gila topminnows occupy a variety of habitats, including: springs, cienegas, permanent and interrupted streams, and margins of large rivers. Habitat alteration and destruction, and introduction of predatory non-native fish, (principally western mosquitofish [*Gambusia affini*]) is the main reason for decline of the Gila topminnow.

2.8c Critical Habitat
No critical habitat has been designated for this species.

2.8d Current Status Statewide
The United States population of the Gila topminnow was federally listed as an endangered species in 1967 (USDOI 1967). The original recovery plan for Gila topminnow listed 10 extant natural populations: Monkey Spring, Cottonwood Spring, Sheehy Spring, Sharp Spring, Santa Cruz River near Lochiel, Redrock Canyon, Cienega Creek, Sonoita Creek (presumably including localities above and below Patagonia Lake), Salt Creek, and Bylas Springs (USFWS 1984). Gila topminnows were also known from Middle Spring (also known as SII or Second Spring) on the San Carlos Apache Indian Reservation (Meffe et al. 1983). Middle Spring was considered part of the Bylas Springs complex in the earlier recovery plan.

Since 1984, Gila topminnows have been discovered or rediscovered at 4 additional locations: North Fork of Ash Creek in 1985 (Jennings 1987), Fresno Canyon in 1992, Santa Cruz River north of Nogales in 1994, and Coal Mine Canyon in 1996 (Weedman and Young 1997). However, Gila topminnow were last collected from the North Fork of Ash Creek in 1985 and from Sheehy Spring in 1987. They have also been very rare or absent during recent surveys (last 5 years) of Sonoita Creek above Patagonia Lake and Santa Cruz River near Lochiel. Mosquitofish are quite common in both areas. Topminnows were extirpated from 1 of the original 10 localities, Salt Creek, by mosquitofish (Marsh and Minckley 1990), but the stream was renovated and restocked with Gila topminnows from Middle Spring. Subsequently, mosquitofish were found in the stream and it was again renovated and restocked with topminnows from Bylas Spring. Thus, there are 14 naturally occurring localities (considering Sonoita Creek above and below Patagonia Lake as 2 separate localities) currently known to support Gila topminnows in the United States.

Eleven of the naturally occurring locations currently supporting Gila topminnows are in the Santa Cruz River system: Redrock Canyon, Cottonwood Spring, Monkey Spring, upper Sonoita Creek, Fresno Canyon, Coal Mine Canyon, lower Sonoita Creek, Santa Cruz River north of Nogales, Cienega Creek, Sharp Spring, and the upper Santa Cruz River. The 2 remaining localities (Bylas Springs and Middle Spring) and Salt Creek are next to the Gila River on the San Carlos Apache Indian Reservation. Bylas Springs has been unsuccessfully poisoned twice to remove mosquitofish (Meffe et al. 1983; Brooks 1985; Marsh and Minckley 1990). Another attempt at renovation of Bylas Springs was done by USFWS Arizona Fishery Resource Office and has so far been successful. The population at Middle Spring was eliminated by lack of water during the summer of 1989, but was recently reestablished (following construction of additional pool habitat) with Gila topminnows from the original Middle Spring population held at Roper Lake State Park. Salt Creek has also been renovated and restocked with topminnows originally from Bylas Spring.

As part of past recovery actions, more than 200 Gila topminnow reintroductions or natural dispersals from reintroductions have occurred at 175 wild locations. For this count, a wild location refers to an area that does not have a mailing address, in contrast with a captive population that does (following Simons 1987). Eighteen wild populations remained in 1997, 17 of which are in historic range (Weedman and Young 1997). Seven of these populations are secure enough that they should persist into the foreseeable future. Minckley and Brooks (1985), Brooks (1985, 1986), Simons (1987), Bagley et al. (1991), Brown and Abarca (1992), and Weedman and Young (1997) describe the plight of re-established and captive populations of Gila topminnows.

Gila topminnows also have been stocked into many captive locations for propagation or conservation. Twelve captive populations were known to persist in 1997. The following publicly maintained populations are large enough to provide individuals for reintroductions, although one is known to be mixed with topminnows from more than one natural population (Arizona-Sonora Desert Museum, Boyce-Thompson Arboretum (mixed), Dexter National Fish Hatchery and Technology Center, Roper Lake State Park, Arizona State University, and Hassayampa River Preserve).

2.8e Environmental Baseline

Gila topminnow currently occupy the Santa Cruz River in its perennial reaches, as far north as Chavez Siding Road. This reach of the river was also occupied by longfin dace (*Agosia chrysogaster*), desert sucker (*Catostomus clarki*), Sonora sucker (*Catostomus insignis*), green sunfish (*Lepomis cyanellus*), and mosquitofish as recently as 1997 (USFWS 2001d). No Gila topminnows occur on the Tumacacori EMA and there are currently no plans for reintroductions in any locations (CNF 2000; D. Duncan, USFWS, pers. comm., 1 October 2002).

2.8f Effects of Proposed Action on the Gila topminnow

Direct Effects

The effects of the proposed action on this species are not anticipated to include direct effects to individual Gila topminnow because no construction will occur within occupied habitat.

Indirect Effects

Habitat Modification

Some indirect impacts to Gila topminnow habitat from erosion are possible from the construction of the proposed action. While the removal of vegetation for construction of access roads will increase surface runoff and sediment transport, and decrease infiltration of precipitation (Gifford and Hawkins 1978, Busby and Gifford 1981, Blackburn 1984, DeBano and Schmidt 1989, Belnap 1992, Belsky and Blumenthal 1997), the implementation of BMPs will help control erosion. However, unusually large precipitation events may temporarily overwhelm BMPs and result in some increase in sediment transport. Nevertheless, the distance of the proposed action from the Santa Cruz River will minimize the amount of sediments reaching Gila topminnow habitat.

Accidental Wildfire

Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). Roads constructed for the proposed action also may allow the establishment or increased density of non-native grasses, such as Lehmann's lovegrass, an invasive species that facilitates wildfires (McPherson 1995). Wildfires could remove groundcover that is important in dissipating rainfall energy and reducing erosion.

However, new roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining what suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban 1987). Early studies of fuelbreak effectiveness in southern California came to similar conclusions (Green 1977). If deemed appropriate, new roads may allow fuelwood collection in areas currently not accessible, thereby reducing the density of downed, woody material, which is capable of carrying wildfires across the landscape.

The measures outlined in the Fire Prevention Plan being developed will minimize the risks of wildfires associated with the proposed action. Measures outlined in the Invasive Species Management Plan also will minimize the introduction or spread of invasive species that may facilitate fires.

2.8g Cumulative Effects

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. While the action area for this species encompasses private, state, and federal land, the habitat with the highest potential for occupancy by Gila topminnow occurs on private land in Santa Cruz County. Most future actions on private land will not be subject to Section 7 consultation.

Although the amount of future private development within Santa Cruz County is unknown, many rural areas of Arizona are experiencing substantial growth. Between 1990 and 2000, Santa Cruz County grew by 29.3 percent (U.S. Census Bureau 2000). Despite its distance from the proposed action, an increase in population in Nogales, Arizona and other regional population centers translates into an increased demand for recreational use of national forest lands.

An undetermined level of border crossings by UDI also occurs within the action area, resulting in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase.

2.7h Effects Determination and Incidental Take

The transport of sediments into the Santa Cruz River may affect the Gila topminnow; however, any increase in sediments will be relatively small because of the distance of the proposed action from occupied habitat. Therefore, it is not likely to adversely affect the species.

Because the proposed action is not likely to adversely affect the species, no take of Gila topminnow is anticipated.

2.9 MEXICAN GRAY WOLF *(Canis lupus baileyi)* (Endangered)

2.9a. Action Area

The action area includes all areas potentially affected, directly or indirectly, by all aspects of the project. Potential habitat for Mexican gray wolf is found within portions of Santa Cruz County containing oak and pine/juniper savannas above 4,000 ft (1,200 m). Wolves may travel long distances during hunting expeditions, typically in an irregular circle 20 mi (34 km) 60 mi (68 km) in diameter. The action area for the Mexican gray wolf considered for the proposed action includes all potential habitat and travel corridors in western Santa Cruz and southern Pima County.

2.9b. Natural History and Distribution

Mexican gray wolves (Figure 20) are the smallest and southernmost of the 5 subspecies of gray wolf in North America. The Mexican gray wolf is a large dog-like carnivore with a mixed brown, rust, black, gray, and white. This species has a distinct white lip line, chin, and throat. Adults weigh between 50-90 lbs (23-41 kg) (Hoffmeister 1986). The historic range was from southeastern Arizona, southwestern New Mexico, southwestern Texas, and south through the Sierra Madre of Mexico. The Mexican gray wolf is the southernmost occurring and most endangered subspecies in North America. This wolf is the last subspecies of gray wolf known to occur in the Arizona-New Mexico area. The last known naturally occurring U.S. specimen was found in New Mexico in 1970 (USFWS 2001d).

Figure 20. Mexican gray wolf.

Historically, Mexican gray wolf habitat was montane woodlands, presumably because of the favorable combination of cover, water, and prey availability. Most wolf collections came from pine, oak, and pinyon/juniper woodlands, and intervening or adjacent grasslands above 1,372 m (4,500 ft) (Brown 1983b). Wolves avoided desertscrub and semi-desert grasslands, but wooded riparian corridors were probably used for travelling and hunting (Parsons 1996).

These are social animals in the dog family that live and travel in packs of 7 to 30 animals depending upon prey size and availability. Mexican gray wolves prey upon a variety of animals from mice and squirrels to deer and elk. Territory size can range from 30 (78 km^2 to 500 mi^2 (1,295 km^2) or more. Packs are led by a pair of dominant animals that control most of the breeding. Breeding season lasts from late winter to early spring, and the dominant female produces up to 6 pups for the pack. The wolves care for the pups communally.

During the late 1800s through the mid 1900s, extensive hunting, trapping, and poisoning efforts at local, state, and federal levels resulted in the extirpation of this species from the United States portion of its range. Reintroduction efforts of captive bred wolves are under way in the Blue Range Recovery Area of eastern Arizona and New Mexico. Fourteen packs have been released to date.

2.9c Critical Habitat
No critical habitat has been designated for this species.

2.9d Current Status Statewide
Mexican gray wolves were listed as endangered by the USFWS in 1976 (41 FR 17736) without critical habitat. In 1998, an experimental, non-essential population was designated for the southwest (63 FR 1763) and a reintroduction program was initiated. Eleven wolves from captive breed stock were reintroduced into the Apache National Forest in southeastern Arizona under the experimental, non-essential designation in an effort to re-establish the subspecies to a portion of its historic range. A Recovery Plan for this subspecies was completed in 1982 and revisions are currently in progress (USFWS 2001d).

Mexican gray wolf populations steadily declined in Arizona because of predator control programs and conflicts with livestock interests. Pressure to control wolves became a priority beginning in the 1920s when this subspecies was nearly eliminated from the state and prevention of wolves from entering from Mexico was undertaken. In 1921 and 1922, a reported 58 wolves were taken by trapping or poisoning in Arizona. By 1924, reported takings dropped to 29 and by 1936, to 5. After 1952, only 2 wolves were reported taken in Arizona, 1 in 1958 and another in 1960 (Hoffmeister 1986). Reports of Mexican gray wolves living in the wild in Arizona continued into the early 1970s (USFWS 1982).

Similar predator control programs in Mexico reduced populations and may have eliminated the wolf by the 1980s. Surveys conducted in Mexico in the early 1990s did not confirm Mexican gray wolf populations in the wild (Parsons 1996).

2.9e Environmental Baseline
The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and ecosystem within the action area. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consideration.

The Tumacacori EMA contains some areas of montane and riparian woodlands that may serve as dispersal corridors for Mexican gray wolves. If wolf populations exist in the mountains of Sonora, these corridors may be used as hunting and dispersal corridors. There are currently no plans to reintroduce the Mexican gray wolf into southern Arizona and, because of the distance and fragmentation of intervening habitat, it is unlikely that current experimental populations in northern Arizona could disperse into Santa Cruz County.

2.9f Effects of Proposed Action on the Mexican Gray Wolf

Direct Effects

Construction Noise and Activity

Because the only wild populations of Mexican gray wolves in Arizona occur in the Apache National Forest, disturbance from construction of the proposed action, even in suitable dispersal habitat, is highly unlikely. In the event that populations of wolves exist in Mexico and could disperse into southern Arizona, the greatest likelihood of disturbance will result from the use of helicopters during early morning or late evening hours. However, because of the linear nature of the proposed action, any noise or construction disturbance will be widely distributed and relatively minor in any single area.

Indirect Effects

Habitat Modification and Fragmentation

Roads can reduce habitat value because of habitat fragmentation and edge effects. Gray wolves (*Canis lupus*) in Wisconsin are limited to places with pack-area mean road densities of 0.7 mi/1 mi^2 (1.1 km/1 km^2) or less (Mladenoff et al. 1995). Some studies have shown that a few large areas of low road density, even in a landscape of high average road density, may be the best indicator of suitable habitat for large vertebrates (Rudis 1995). Access and construction roads for the proposed action commonly are spurs from existing roads and range between 500 ft (152 m) and 1,000 ft (305 m) in length, which do not isolate or separate habitat patches. Furthermore, construction activities within montane woodlands, riparian corridors or major canyons will be minimal and widely distributed, resulting in negligible impacts to the composition or structure of Mexican gray wolf habitat.

Increased Legal and Unauthorized Access to Mexican Gray Wolf Habitat

Gray wolves experience negative interactions with humans and roads are a key facilitator (Thiel 1985). Increased human access to potential wolf habitat through the use of temporary proposed construction roads could reduce the quality of the habitat and human interactions may increase mortality (Mech 1973). The road closure techniques outlined in the SECTION 1.4 and the RA (URS 2003) will minimize unintended uses of these roads.

Accidental Wildfire

Increased road access may contribute to an increase in the frequency of human-caused ignitions in some areas (Gucinski et al. 2001). Because of their mobility, wolves will not likely be directly impacted by wildfires; however, these wildfires could potentially alter or destroy portions of prey species habitat. While the short-term effects of wildfires may affect prey species through loss of forage from the fire, increased herbaceous production in the years following a fire may improve habitat in the long term.

New roads also may act as firebreaks and improve response time of firefighters to wildfires, thereby preventing these fires from gaining in size and intensity. A study in southern California concluded that the road network had been a key factor in determining suppression strategies were used, both in firefighter access and because roads were widely used for backfiring and burning-out operations (Salazar and Gonzalez-Caban

1987). Early studies of fuelbreak effectiveness in southern California came to similar conclusions (Green 1977). If deemed appropriate, new roads may allow fuelwood collection in areas currently not accessible, thereby reducing the density of downed, woody material, which is capable of carrying wildfires across the landscape. Fire prevention measures outlined in the Fire Prevention Plan will minimize the risks of wildfires associated with the proposed action.

Invasive Species

Roads may be the first point of entry for invasive species into a new landscape, and can serve as a corridor along which plants move farther into the landscape (Lonsdale and Lane 1994, Greenberg et al. 1997). Some invasive plants may then be able to move into adjacent patches of suitable habitat. Invasion by these plants may have significant biological and ecological effects if the species are able to disrupt the structure or function of an ecosystem. Roads constructed for the proposed action could allow the establishment or increased density of non-native plants, such as Lehmann’s lovegrass, an invasive species that facilitates wildfires (McPherson 1995). Measures outlined in the Invasive Species Management Plan will minimize the introduction or spread of invasive species as a result of the proposed action.

2.9g Cumulative Effects

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this biological assessment. While the action area for this species encompasses private, state, and federal lands, the habitat with the highest potential for occupancy by Mexican gray wolf occurs on USFS land in Santa Cruz County. Future federal actions will be subject to Section 7 consultation and will not be considered cumulative.

Although the amount of future private development within Santa Cruz County is unknown, many rural areas of Arizona are experiencing substantial growth. Between 1990 and 2000, Santa Cruz County grew 29.3 percent (U.S. Census Bureau 2000). Despite its distance from the proposed action, an increase in population in Nogales, Arizona and other regional population centers translates into an increased demand for recreational use of USFS land.

An undetermined level of border crossings by UDI also occurs within the action area and results in habitat damage from new roads, discarded trash, illegal campfires, and disturbance near water sources. These border crossings are likely to continue or increase into the foreseeable future.

2.9h Incidental Take

Construction noise and activity associated with the proposed action may affect the Mexican gray wolf, but it is not likely to adversely affect the species because any disturbance will be widely distributed and short term in duration. Because the proposed action is not likely to adversely affect the Mexican gray wolf, no take is anticipated.